Posted: Wed Aug 24, 1983 8:55 PM PDT Mss: PGID-1613-3477
From: PKARN
To: tclark,pacsat
Subj: Optimal demodulation

Tom,
I've done some reading up on optimal reception of noisy signals and I think I can offer some insight into the integrate-and-dump vs HDLC DPLL question we talked about on the satellite the other night.

An optimal receiver uses either a signal correlator or a matched filter; mathematically it can be shown that they are equivalent. In a correlator you multiply (in parallel) the received signal by local replicas of each possible transmitted signal and integrate each product over the bit time. The integrator with the largest output at the end of the interval wins and its symbol is declared as the output symbol for that bit time.

Since BPSK signalling is not orthogonal, (in fact it is antipodal, the two possible signals are inverses of each other) you can get away with one multiplier and one integrator. Looking at the polarity of the output signal at the end of a bit time tells you the bit. Since in theory the original signal is a unity amplitude square wave (of unknown sign), the multiplier ahead of the integrator can be dispensed with. However, since the input signal is likely to be band limited before transmission, I think this would degrade the error performance of the detector. Does the BITREG use a multiplier before the integrator?

You can appreciate this intuitively: suppose the input is a low pass filtered raw bit stream signal in which each bit looks like a noisy half sinusoid. If you don't multiply (weight) this signal by its local replica, noise riding on the bit edges can get integrated and possibly affect the result. There's no point in letting the integrator respond during periods when you KNOW that the input signal has to be either small or zero.

On the other hand, the matched filter approach does not require an integrate-and-dump circuit. You put a "matched filter" in the channel and simply sample its output at the end of each bit period. If the input signal is s(t), the matched filter must have an impulse response of the form s(T-t), where T is the bit period and t is time. In other words, it has an impulse response which is a delayed and INVERTED IN TIME replica of the signal waveform. Reversing the time axis in the time domain corresponds to taking the complex conjugate in the frequency domain; ie., the magnitude stays the same but the phase changes sign.

What this really means in English is that the matched filter should have an amplitude response shape matching the spectrum of the input signal and a phase response which equalizes any phase nonlinearity in the input signal; in addition there needs to be a fixed time delay so that the output decision sample is made at the right time.

As far as adapting the Phase 3 PSK modems to TAPR TNCs goes, this all seems to indicate that IF you low pass filter the raw data stream from the AFDEM or IFDEM such that you match the spectrum of the transmitted data and compensate for any phase distortions, you should be able to dispense with the BITREG integrate-and-dump circuit. Doing this with HDLC means that you can now do away with the wasteful "every other edge is clock" mode of Manchester encoding and let the 1933's DPLL extract clocking from the guaranteed transitions that occur at least once every 6 bits due to HDLC bit stuffing. This will allow you to make the noise bandwidth only half as wide as it would otherwise be with Manchester encoding, thereby gaining a 3 db improvement in bit error

rate, or you should be able to transmit 800 bps in the same spectrum space as the 400 bps Manchester telemetry beacon.

I am going with this matched-filter route for the PACSAT modems. Over the past few days I have been writing Unix programs to simulate various filter types (Butterworth, Bessel, etc) in the time domain, along with gaussian noise generators, etc. With this I will be able to simulate in monte-carlo fashion the actual bit error performance that could be expected with various filter types and orders. In particular I'm interested in seeing how much is lost by using the MF-4 Butterworth low pass filter due to its non-optimum phase response; if the loss is minimal it will allow me to save considerably on the parts count. If the degradation is significant I'll have to design a Bessel (optimal) filter instead with the MF-10; unfortunately National doesn't make 8-pin Bessel filters yet.

Comments?

Phil

TO: HM
FROM: DC
SENT: 13 JUL 83 08:46:07
READ: 13 JUL 83 15:46:08

PACSAT documentation routins
July 13, 1983

OnTyme system

LSK - Larry Kayser Ottawa liason, RAMUNIT group leader, S/C consultant
TC - Tom Clark Washington liason, AMSAT President
LJ - Lyle Johnson Tucson liason, microprocessor group leader
BR - Bill Reed Dallas liason, ground station manager
HP - Harold Price Los Angeles liason, software manager
DC - Den Connors New England liason, project manager, program manager
PE - Pete Eaton St. Louis liason, integration consultant
PK - Phil Karn communications channel group leader

SER - Steve Robinson AMSAT AVP for R&D
PLR - Paul Rinaldo ARRL liason
WWP - Bill Putney OnTyme coordinator
HM - Hank Magnuski AMICON coordinator
PB - Port Barlow documentation?

Telemail System

AMSAT - used to place notices of documentation available in PACSAT BB
ARRL - Bernie Glasmeyer ARRL liason
DEN - Den Connors (use Ontyme)
HMAGNUSKI - Hank Magnuski (use Ontyme)
HPRICE - Harold Price (use Ontyme)
JDUBOIS - John DuBois Phase III command station leader, modulation consultant
JKING - Jan King Washington liason, AMSAT VP Eng, launch manager
LJOHNSON - Lyle Johnson (use Ontyme)
LKAYSER - Larry Kayser (use Ontyme)
MNAKAYAMA - Miki Nakayama JAMSAT liason, JAS-1 PACSAT manager
MSWEETING - Martin Sweeting UoS liason, s/c manager
PACSAT - PACSAT Bulletin Board
PEATON - Pete Eaton (use Ontyme)
PKARN - Phil Karn (use Ontyme)
PRINALDO - Paul Rinaldo (use Ontyme)
SROBINSON - Steve Robinson (use Ontyme)
TCLARK - Tom Clark (use Ontyme)
VITA - Gary Garriot VITA PACSAT manager
VRIP - Rip Riportella AMSAT EVP
WREED - Bill Reed (use Ontyme)

PBARLOW - Port Barlow - (use Ontyme)
BSORENSEN - Bob Sorensen ground station design?
CMURCKO - Chuck Murcko ground station design?

Any documentation appearing in PACSAT BB on Telemail (with pointer from AMSAT BB) will be routed to Ontyme distribution. Similarly, any message appearing in Ontyme PRNER.DC with a "To: distribution " label in the first few lines will be routed to PACSAT BB with AMSAT BB pointer.

Users capable of accessing each medium are urged to distribute their own

documents usins the followins procedures.

To send messases to all PACSAT team members on Ontyme, use the command :SEND ** PACSATGROUP.

For distribution on Telemail, use the addressee PACSATGROUP in the compose command.

Den

To : Hank Magnuski, KA6M
Terry Fox, WB4JFI
Dave Borden, K8MMO
Phil Karn, KA9Q
From : Paul Rinaldo, W4RI
Subject: AMICON Gateway, SSIDs

Dave: Appreciate your message of July 3 on various CQs. I think that its worthy of some discussion. I suspect that there's more to it, though, to come up with a scheme for various flavors of general, group or indefinite calls. About all I can suggest is that you come up with a proposal and get some comments. But, with your forbearance, I'd like to sidestep this issue and try to finesse the SSID problem so that the transmitting stations (source and optional repeater) can legally identify themselves using the frame address field without /A, /B or /R appended (which won't fit). Also, that's interesting about ARPA's method of finding out what nodes are alive. I hope that we can minimize the AUX operation network diagram requirement in discussions with the FCC. As I understand it, a current net diagram needs to be kept in the AUX station records, not filed with the FCC. It would seem that any area-real-time "who's-alive" tables for the packet network are more properly the concern of packet radio switching nodes (for reasons of routing and network management) rather than a burden that each AUX link should bear.

Hank: Thanks for your message of July 2 on SSIDs. I had a telephone conversation with Terry last evening, and we talked about some different approaches. At the risk of misquoting him, I think that Terry's desire is not to hash the SSID table and arrange similar activites in consecutive blocks.

The problem, now, is complicated by the earlier selection of combination 1111 for all call, also by the assumption that most current packeteers are starting with 0000 or 0001 and working upward. So that means that terminal (personal) stations are, at least for the moment, clamped to the lower code combinations, such as 0000, 0001, 0010 and 0011, to choose a contiguous block of four combinations.

In the high-end block of four code combination (1100, 1101, 1110 and 1111), 1111 is already assigned to all call, leaving three for possible use.

Blocks 01## and 10## are clean, as far as I'm aware, and could be used as substitutes for /R and /A for RPT and AUX operations.

In the above discussion I left out the equivalent of /B, which we need to make beacon stations legal.

So, here's my SSID assignment strawman:

Code	Assignment System
0000	First terminal station
0001	Second terminal or third host station
0010	Third terminal or second host station

0011 First host station

0100 First repeater or packet-switching station
0101 Second repeater or packet-switching station
0110 Third repeater or packet-switching station
0111 (Reserved for repeater or packet-switching station)

1000 First auxiliary-operation station
1001 Second auxiliary-operation station
1010 Third auxiliary-operation station
1011 (Reserved for auxiliary operation)

1100 Beacon operation
1101 Earth operation.
1110 (Reserved)
1111 All call

The first block of four code combinations would recognize that the stations currently on the air are probably starting from 0000 and working upward. So, I have 0000 for the first terminal (or personal) station and 0011 for the first host station (a computer which provides a service to either the network or the station licensee). They would work toward the middle of the block for subsequent assignments. I'm a little uneasy about having enough combinations for terminals and hosts. But I think that they naturally group themselves together because we will probably have situations in which the operator uses this SSID entity as a terminal while in the shack and changes it to a host that will automatically answer, send/receive messages and possibly provide a network data service.

While individuals may have only one repeater or network switching node, clubs could have more. I'm throwing repeaters and packet-switching stations together here because they both automatically receive, process and transmit frames/packets. I would guess that the FCC would think that both fall under repeater rules, and the fact that one is stupid and other is intelligent wouldn't make much of a distinction from a regulatory point of view. Reserving one code combination seems prudent; maybe we ought to reserve 0110 and 0111.

Auxiliary operation may be needed not only as one of the "personalities" of an AMICON gateway (the other being "earth operation) but required for AUX links for repeaters, remote bases and perhaps other uses. So I think it's conceivable to need as many as four under one call sign. Again, I suggest that at least one code combination be reserved for future assignment.

This last block of four can take care of the miscellany. I can't conceive of a need for more than one code combination for beacon operation, even if a station has a beacon on each band. In the case of 1101, I put earth operation there just because it seems prudent to be able to identify, by SSID, the licensee's satellite gateway station (its personality that talks to satellites as distinct from its AUX personality). I don't think we need it for FCC legal i-d purposes as in the cases of AUX, RPT and BCN operations. This raises the questions of whether to use it for (a) only stations acting as gateways, or (b) any earth station talking to a satellite. Maybe this is unnecessary. And finally, 1111 is all call. This differs from the rest in one respect. 1111 is primarily a destination SSID, less so for the

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repeater address field, and certainly can't be used as a source address SSID. So, 1111 as a source address is presently a no-no but could have a future use.

Please rip it to shreds and let me know any counter schemes soon because we need an agreed scheme to take to the FCC to get a favorable gateway interpretation.

73, Paul, W4RI

TO: HM
FROM: HP
SENT: 15 JUN 83 18:45:52
READ: 15 JUN 83 19:39:07

To: Hank and Mike
Re: 1st Invitational West Coast Linkins Conference

Goal: To provide a forum to discuss the creation of a prototype network to move data and provide a QSO path from San Fransisco to Los Angeles to San Diego and points in between. The purpose is to get somethins up and runnins to maintain and expand interest in packet radio, not to desisn the ultimate network. Another purpose is to lay the sround work for the sites, RF sear, and frequencies the future networks will require. The disital portion of the network should rely as much as possible on currently available hardware and software.

Dependins on the number of attendees, the location will be either a conference room at my office, or my home QTH. Both of these places are within 5 miles of LAX.

Time and date: 12:00 - ? 7/9/83

The LA sroup will supply transportation to and from the airport for those flyins in.

I'll send out a list of attendees but it looks like the risht people will be here. In addition to NK6K, WA6JPR, and WB6YMH from the local area and hopefully WB6HHV and KA6M, we'll have some folks here from the middle sround between SD and LA as well as someone from between SF and LA.

Brins as many people alons as you like, but try to keep it down to "workins sroup" size.

Lunch will be supplied durins the meetins, and we'll pick a nice place for dinner. I have room to put up a few people overnite but we should be able to wrap thinss up in time for the last flisht out to S.F.

Please confirm your attendence and let me know who else from your areas will attend.

73,
Harold, NK6K

TO: HM
FROM: HP
SENT: 06 JUL 83 21:05:17
READ: 06 JUL 83 23:39:21

TO: Mike, Hank
FM: Harold

The location of the meetins will be:

1211 Ford Ave,
Redondo Beach (213) 376-3147

Use 144.76 simplex for talk in. This is the input to WB6YMH. If it is up (it's currently broken) we'll be listenins on the output as well (145.36). We will probably have a remote base on .76 so we'll hear you.

Hank, I'll be at the airport for the pickup. I'll meet you outside the terminal buildins, let me know if you won't have a hand held. Assumins you will, call on 144.76 when you set outside. I'll be circlins around in traffic.

Mike, the best way to my place is to set off 405 at Inslewood. Go south till you set to Grant. You'll cross two major intersections on the way to Grant, Manhattan Beach and Artesia. Turn right on Grant, so west past several lights till you set to Aviation. Turn left on Aviation, then left assin at the next light, this is Ford. 1211 is 10 or so houses down Ford on the right, the only one with a pair of roof mounted KLM 144 and 440 cross beams pointed skyward.

Hank, no problem commins direct Friday nite, we've sot a spare room/bed.

73,
Harold.

Ps, date is 7/9/83, time is 10:00

Posted: Sun Jul 3, 1983 1:52 PM PDT Msg: RGEN-1588-7037
From: VK1?
To: AMSAT
Subj: Mode-L Errors In ORBIT/ASR

For those wondering how the errors in the L-Band frequency specification in ORBIT #13 arose, the following is forwarded.

I have traced the error back Werner's (DJ5KQ) manuscript. It correctly says 1268 (etc) although we all know it is 1269 (MHz). Later the error was carried through to ASR. Most recently it was propagated to the W5YI Report.

Corrections are being published in ASR 58/59 and ORBIT #14. In the meantime, please set the correct numbers out. L Mode is: 1269.050 - 1269.850 and 436.950 - 436.150. Refer to page 50, QST, April 83.

To: Paul, W4RI
Fm: Dave, K8MMO
Subj: AMICON Gateway

1. I have been monitoring your conversations with Hank on the gateway problem. Great legal stuff there, worthy of Neil.

2. I suggest that construction of the system network diagram can be done at any time, easily. It requires the current TAPR and Vancouver software to be modified to respond to CQ. I suggest that various CQs should be added.

a. CQ 0 meanins CQ personal stations
b. CQ 1 meanins CQ any computer hosts
c. CQ 2 meanins CQ any repeaters
d. CQ 3 meanins CQ any beacons
e. CQ 4 meanins CQ any OSCAR aux stations

Thus an inquirins personal packet station could find out what is available on the channel at any time. A CQ would be answered by the appropriate type of station. Normal contention schemes would take care of collisions (perhaps some mod would be required since this is not connected operation). Thus, a computer attached to a packet board could establish a network diagram with three CQs (in theory).

In terms of legality, the computer could log results to disk and include a DTG with each entry. This could satisfy the requirement easily. This should be easy on an environment like OSCAR 10 where all aux nodes can be heard or are not in the network. The problem of other nodes relaying thru the OSCAR aux could be solved if the aux would respond to command to poll all users. Thus our logger computer would call CQ aux (or whichever). Upon discovering a aux in OSCAR range, it could command that aux (previously programmed correctly of course) to poll all users. As each user responded, the logger would write to disk. The logger could then command the next machine that answered the CQ to poll, etc. Thus a complete network diagram could be constructed, for that time (more or less-people [illegible] off without telling anyone). The problem I see is the same one you mentioned, how often do we need a net diagram? Every 10 minutes? This could hog up the channel just finding out who is alive. Of course ARPA does this 10 times a second and builds tables at each node of who is now alive. They can afford this because of their high speed packets. I think we can do a similar thing, maybe once an hour.

[illegible]
[illegible]

To : Phil Karn, KA9Q
[illegible] : Hank Magnuski, KA6M
Terry Fox, WB4JFI
From : Paul Rinaldo, W4RI
Subject: AMICON Gateway and FCC Rules

Sorry to have taken so long to respond to your message. Other things got in the way.

Shortly after I received your message I showed it to Dave Sumner, K1ZZ and Perry Williams, W1UED. Dave thought that we had a chance of a favorable interpretation of existing FCC rules. After some study, Dave, Perry, Dale Clift, Burnie Glassmeyer and I got together on June 30. We now feel that it is possible to cover AMICON gateway operation under present rules but that we'll have to prepare the rationale and present it to Jim McKinney at the FCC to get his blessing.

The argument is that the gateway does not have to be just one kind of Amateur Radio station. As an example, the FCC has applied the term "split personality" to repeaters, i.e., one [illegible] repeater operation, the other while autopatching. So, it [illegible] seem that we could propose that a gateway station has the dual personalities of:

(1) "earth operation" in the Amateur-Satellite Service under 97.403(b), 97.409 and 97.415 of the rules, and

(2) "auxiliary operation" per 97.61(d), 97.84(d)(2) and 97.86 of the rules.

The earth operation personality seems to be without snags. Here's what the rules [illegible]:

(1) 97.403 states:

> "Earth operation. Earth-to-space-to-earth amateur radiocommunication be means of radio signals automatically retransmitted by stations in space [illegible]."

[illegible]

> "Any Amateur Radio station is elisible for earth operation ...; subject to the privilegis of the control operator's class of license..."

(3) 97.415 states:

> "The followins freauency bands are available for space operation, earth operation, and telecommand operation:
>
> Frequency bands
>
> | kHz | MHz | GHz |
> |---|---|---|
> | 7000-7100 | 21.00-21.45 | 24-24.05 |
> | 14,000-14,250 | 28.00-29.70 | |
> | [illegible] | | |

The rules governing the auxiliary operation personality are:

(1) 97.61(d) states:

> "All amateur frequency bands above 220.5 MHz, except 431-433 MHz, and 435-438 MHz, are available for auxiliary operation."

(2) 97.84((d)(2) states:

> "When identifying by radiotelegraphy, a station in auxiliary operation shall transmit the fraction bar DN (overscored) followed by the letters "AUX" or "A" at the end of the station [illegible]"

(3) [illegible]

> "(a) A station in auxiliary operation, either locally controlled or remotely controlled, may also be operated by automatic control when it is operated as part of a system of stations in repeater operation operated under automatic [illegible]
>
> "(b) If a station in auxiliary operation is relaying signals of another amateur radio station(s) to a station in repeater operation, the station in auxiliary operation may use an input (receiving) frequency in frequency bands reserved for auxiliary operation, repeater operation [illegible]
>
> "(c) A station in auxiliary operational shall be used only to communicate with stations shown in the system network diagram.

The auxiliary operation personality has a few things to be ironed out to make things legal. Probably the most important one is the 97.86(c) requirement limiting communication to stations shown in the system network diagram. In fact, the AMICON gateway auxiliary operation could be communicating directly with a packet-radio station or it could be communicating with a packet repeater or packet network switch which in turn is connected with a terrestrial packet-radio network. To comply with 97.86(c) one would need to show the entire packet-radio network and perhaps update it day by day, hour by hour. Well, that doesn't seem [illegible] possibly we could get the FCC to buy just showing the packet link to the first repeater/switch then some dotted [illegible] off to the amateur packet-radio network.

Note that 97.86(b) would allow the gateway auxiliary operation to have "an input (receiving) frequency in the frequency bands reserved for auxiliary operation, repeater operation, or both." If the neighbor packet-radio station (whether individual station, packet repeater or packet switch) is operating above 220.5 MHz (except 431-433 and 435-438 MHz), then no problem. If the neighbor is operating on 2 meters, for example, the 2-meter frequency can be used for input to the

auxiliary operation of the gateway can be facilitated. Output frequency must be above 220.5 mHz. One way to live with that is to for the neighbor to install an auxiliary receiver on the frequency chosen above 220.5 MHz. Another would be for the neighbor to send and receive to the gateway auxiliary operation on a frequency above 220.5 MHz. That could be done by the neighbor repeater/switch operating input and output on a frequency above 220.5 MHz for normal packet repeater/switch service and for feeding the gateway auxiliary operation. The alternative would be to use (say) 2 meters for the packet repeater/switch operation for the local area and use a frequency above 220.5 MHz for an AUX link to the gateway.

Also, there is some concern that the FCC would not like the possibility that a packet coming from the gateway auxiliary operation on a frequency above 220.5 MHz could pop out of a packet repeater/switch operating on (say) 2 meters. Note that the wording of 97.86(b) seems to clear the way for something that appears on a repeater frequency (below 220.5 MHz) to be presented to the input of the gateway auxiliary operation. So, we need to discuss this point with them.

Another thing possibly needing a look is identification. If, as under the old rules, we identify the auxiliary operation on the air with cw and send /A or /AUX, then fine. But, if we don't want to send the legal i-d by cw, then we have to send it in the source address of the HDLC frame address field. So, it looks to me like we ought to designate a specific Secondary-Station Identifier (SSID) combination to mean AUX for all stations. Then, following that logic, we could go to the FCC and get them to recognize that combination as a legal substitute for /A or /AUX when used in the frame address field. While we're at it, why not come up with specific SSIDs for /R or /RPT and /B or /BCN to get them recognized at the same time. (Assuming Hank and Phil agree, Terry -- how about designating 3 specific SSIDs for equivalents of AUX, RPT and BCN?)

Does any of this make sense to you? If so, then we'll prepare some paperwork and visual aids and go with Perry to the FCC upon receipt of your go ahead.

73, Paul, W4RI

Subject: Amateur chart revised
Newsgroups: net.ham-radio

TABLE OF AUTHORIZED EMISSIONS IN THE AMATEUR SERVICE

** 20 meter phone band expansion effective May 22, 1983
*** New FSK, shift, and ID rules effective June 15, 1983

Novice/Technician A1 emission only	General/Advanced A1 and F1	Extra A1 and F1
3700 - 3750	3525 - 3775	3500 - 3775
7100 - 7150	7025 - 7150	7000 - 7150
21100 - 21200	10100 - 10109	10100 - 10109
28100 - 28200	10115 - 10150	10115 - 10150
	14025 - 14150	14000 - 14150
	21025 - 21250	21000 - 21250
	28000 - 28500	28000 - 28500

NOTE: 250 watts max input in Novice subbands and 30 meters.

General	Advanced A1, A3, A4, A5, F3, F4, F5	Extra
3890 - 4000	3800 - 4000	3775 - 4000
7225 - 7300	7150 - 7300	7150 - 7300
14225 - 14350	14175 - 14350	14150 - 14350
21300 - 21450	21270 - 21450	21250 - 21450
28500 - 29700	28500 - 29700	28500 - 29700

160 Meters (Illinois) A1 and A3 only

KHz	Day power	Night power
1800 - 1900	1000	1000
1900 - 1925	500	100
1925 - 1975	100	25
1975 - 2000	500	100

6 and 2 Meters:

50.0 - 50.1	A1 only
51.0 - 54.0	A0, A1, A2, A3, A4, A5, F1, F2, F3, F4, F5
50.1 - 54.0	A1, A2, A3, A4, A5, F1, F2, F3, F4, F5
144.0 - 144.1	A1 only
144.1 - 148.0	A0, A1, A2, A3, A4, A5, F0, F1, F2, F3, F4, F5

The bandwidth of an F3 emission below 29 MHz shall not exceed that of an A3 emission.

The "Considerate Operators Frequency Guide"
(Frequencies generally recognized for certain activities)

1800 - 1825	cw only	14.08 - 14.10	RTTY
1825 - 1830	dx window	14.23	SSTV
1850 - 1875	dx window	21.09 - 21.10	RTTY
3610 - 3630	RTTY	21.34	SSTV
3687.5	AMTOR	28.09 - 28.10	RTTY
3845	SSTV	28.68	SSTV
7090 - 7100	RTTY	29.30 - 29.50	SATELLITES
7171	SSTV	29.52 - 29.58	RPTR inputs

10.14-10.15	RTTY	29.6	FM simplex
14.075	AMTOR	29.62 - 29.68	RPTR outputs

DIGITAL COMMUNICATIONS: (F1, 3.5-28 MHz)(A2, F1, F2 above 28 MHz)

BAUDOT: (International Alphabet #2)
A2, F1, F2: Maximum frequency shift = 1000 Hz.***
A2, F2: Highest modulating frequency = 3000 Hz.
Maximum speed = 100 wpm (75 baud).

ASCII: Maximum baud rates:
3.5 - 28 MHz = 300 baud
28 - 50 MHz = 1200 baud
50 - 220 MHz = 19500 baud
220 - up = 56000 baud

AMTOR: TOR specifications are found in CCIR Rec. 476-2.
(100 baud, Block rec. rate 2.222/sec.)

NOTE: Above 50 Mhz, the frequency shift in Hz shall not exceed the sending speed in baud, or 1000 Hz, whichever is greater. ***

OTHER DIGITAL CODES: (ABOVE 50 MHZ ONLY!)
Any other digital code may be used above 50 MHz in the domestic U.S. (Except where A1 only is permitted). A description of the code and modulation technique must be kept in the log.

Bandwidth limitations:
50 - 220 MHz = 20 kHz max.
220 - 1215 MHz = 100 kHz max.
1215 and up = any Bw if in accordance with 97.61(b) and 97.73(c).

NOTE: When using digital communications, CW or phone ID is no longer required after June 15, 1983. The ID may be given using Baudot, ASCII, or AMTOR.

FACSIMILE and TELEVISION:

Below 50 MHz the bandwidth of A4, A5, F4, F5 must not exceed that of an A3 SSB signal.

50 to 225 MHz:
The bandwidth of A4 and A5 SSB emissions must not exceed that of A3 SSB emissions.

The bandwidth of A4 and A5 DSB emissions must not exceed that of A3 DSB emissions.

Type F4 and F5 emissions shall be limited to a peak deviation of 5 KHz with a maximum modulating frequency of 3 KHz. Alternatively, the bandwidth shall be no greater than 20 KHz.

Below 225 MHz, type A4 and A3 or type A5 and A3 emissions are allowed simultaneously on the same frequency if the bandwidth is no greater than type A3 DSB.

Note: Fast Scan television transmissions may be identified using "readily lesible characters when A5 emissions are used". ***

Program Manager's Report to the PACSAT Team
June 19,1983

To: Coordinating Agencies - Gary Gariott (VITA), Martin Sweeting (University of Surrey)
Project Managers - Harold Price (Software), Bill Reed (Ground Station)
Group Leaders - Larry Kayser (RAMUNIT), Phil Karn (Modem), Lyle Johnson (Processors/Procurement), Jan King (Spacecraft/Launch Vehicles)
AMSAT Leadership - Tom Clark (President), Rip Riportella (President-Elect), Bill Lazarro (General Manager)

The launch of Oscar-10 and relocation of four-fifths of the PACSAT design staff has caused slips in the desired progress of the PACSAT program. This memo is intended to let all know simultaneously what is planned for the next steps.

Our first goal is to produce the required design document, per our current funding authorization. The outline of that document follows. Each group leader currently working on aspects which are to be detailed in the document should either present a brief report that covers the subject, or wait for my interpretation of the current status, and comment on my correctness. We cannot wait any longer, and the most critical design constraints have already been worked out by the more active teams.

A parallel set of efforts must be undertaken immediately. A list of these is included here; I am hoping each team member will be able to contact me electronically or by telephone, toll-free, at 800-225-00654 X6589. I am at the International Computer conference Monday through Wednesday gathering technical assistance for the project locally, and will be demonstrating some packet radio systems early Thursday, but will be available Thursday afternoon and Friday.

The highest priority is to be given to a concept presented by Martin at the last Joint design meeting. After discussions with Jan this weekend, I am convinced that an actual demonstration of the PACSAT concept would be an invaluable tool, both for providing a set of technical references to compare modem, RF and protocol designs against, and (at least equally as important) for demonstrating the concept to external groups. Specific targets would be the funding agencies and governing bodies which hold the key to PACSAT's success, and also the amateur population, particularly high-tech hams in the central design and fabrication localities, who will be able to provide the critical volunteer manpower for PACSAT.

This demonstration project would require the support of Martin's team, particularly in providing three boxes capable of interfacing to proper microcomputers and RF equipment. In addition to the Surrey site, it is desired to have the PACSAT operations center and VITA headquarters equipped with UoSAT ground stations, as well as a prototype portable ground station to be tested first at PACSAT Ops, then sent to the PACSAT regional centers for evaluation (Los Angeles, Dallas, Tucson, Ottawa, Washington D.C.), then finally sent overseas to one or more actual VITA sites for demonstrable tests.

Martin must provide the go/no-go on this experiment, based on the needs of the UoSAT/OSCAR-9 project, but at last discussions, this seemed to be quite do-able. 438MHz uplink, 146MHz downlink and use of the on-board RAM and asynchronous AFSK modems should provide a convincing demonstration indeed!

Phil's modem design must await sucessful firing of OSCAR-10's ensine, which is perhaps as much as three to four weeks away. Following those manouvers, the fabracation facilities of the PACSAT team will be brought to bear on a set of prototype modems. The logical mechanism for testing these units will be OSCAR-10's AMICON packet channel, with 10 providing a variety of distances and fading conditions for VERY realistic testing. Again, the ground station team must support this effort with phase III ground station interfacing. WARNING... both 1200 and 9600 baud tests must be made eventually, so expect to see some periods of utilization of the center of the transponder passband, and prepare for same.

Martin, Gary, Jan and myself must prepare a document to be presented to NASA at the earliest possible time, requesting a set of dual-launch vehicle scheduling considerations. In spite of the probable early scheduling of the Landsat D-prime mission, the possibility of further Delta launches must not be ruled out. Additionally, we may expect to see some further assistance with teh GAS can implementation from groups not currently involved in the effort.

A probable result of the above efforts will be a credible set of demonstrables and associated documentation/publicity, which may very well in turn cause both funding agencies and those government agencies which must become involved, to provide us with the mechanism to accomplish the goals of spacecraft/experiment construction, integration and launch.

This brings up the only subject I consider sticky; who's going to manage and do all this?

A most-likely scenario, subject to change, would go something like this:

o program management would continue from the Boston area
o a project manager must be named, there are excellent candidates avaiable at this time. this manager must reside in one of the current technical centers (Boston, Dallas, Los Angeles or Washington), or perhaps a new center (time constraints seem to prohibit this). this person must provide the inter-group coordination, maintain schedules, handle resource allocation, and provide the daily interface with the funding, spacecraft and launch agencies. (paid position)
o a PACSAT-1 manager must be named, with same constraints as above regarding location. this manager must provide all of the integration of experiment hardware and software from the various design/construction teams. the responsibility for a deliverable experiment package rests with this this individual. (paid position)
o the design teams must continue to provide input to the systems design. specifically, Larry has provided sufficient information to specify the memory constraints and requirements. Lyle must continue to field requests for technical information. Phil must continue the modem design to a practical conclusion following the OSCAR-10 activity. Bill must begin the preparation for demonstrations with the active Dallas AMSAT crew.

o new team members must be found to assist in actual design and construction efforts. Larry seems to be ahead of the rest in gathering a group of team members for the RAMUNIT. Harold has a good team, which he may have to supplement. Lyle may be able to use some of TAPR's resources to provide both linking facilities for experimentation, and direct design assistance in packet hardware and protocols. I will endeavor to find over-qualified specialists in this high-technology region who will be willing to review designs of all aspects. Others are urged to find hams with similar desires to review, and it is assumed that the publicity will help to locate these fellows. Additionally, each design team will have to come up with implementors locally, or provide a well-documented set of needs to be fufilled by PACSAT Boston and Washington implementors.

o because of the time constraints, we will assume a spacecraft very similar to the UoSAT-1 unit. Some simplifications will be available from the mission change from one of scientific research to that of digital communications. A modification of the spacecraft superstructure will be required for possible inclusion in the GAS-can program. One whole side of the spacecraft may be assumed to be required for the RANUNIT set, while another side will be needed to house the dual experiment package. The RF equipment must be integrated to the command and telemetry R[illegible] subsystem, in a manner similar to that specified in the last Washington design meeting.

o VITA must be provided a set of publicity documents, generated from the design document. Again, some volunteer effort will be required. Publicity for the demonstrations will be provided in the major amateur magazines by the program management staff, while VITA must provide the vectoring of information to the involved agencies.

I cannot expect every team member to agree with everything I've written above. Please contact me, and use violent outbursts, if necessary, to express your feelings on all of the above. We must have detailed feedback, and quickly, if this is to fly.

For all of the hassles, pain and mis-spent efforts which a project of this magnitude will generate, I still feel strongly in line with Jan's feelings. This is perhaps the very best way we amateurs can continue to Justify the gross over-allocation of precious spectrum resources we have been given in the ether.

Vern WD2S

PACSAT Design Document
Draft Format
20 June, 1983

General Introduction
  PACSAT as a proof-of-concept
    information dissemination to less-developed countries
    general global digital store-and-forward messaging system
    global internetwork node

requirements definitions
  user constraints
    typical ldc information needs

VITA organizational framework
Amateur Satellite Service constraints
typical amateur communications needs
internetwork needs

(refer reader to detailed technical specifications as an appendix)

functional description of experiment
operational modes
flexibility of experimental packaging
shareable resources
RF signalling path
multiple 438MHz uplinks w/ 1200/9600bits-per-sec data rates
dual downlinks (one per package) w/ 1200/9600 capability
messaging capability
2Mbytes of RAMUNIT in two one-mb package sets
shareable memory resources (under certain constraints)
up-loadable protocols for service reconfigurations as usage warrants

functional description of ground stations
two classes of users
remote, solar-powered units
high-speed 'well-endowed' stations
two modes of access
1200 baud modulation through slightly modified rigs/TNC's
9600baud with special RF decks and TNC's

functional description of satellite
UoSAT-class spacecraft
(w/ mods)
combined antenna systems
independent control processor
power sources
magnetic torquing capability (sun sensors)
dual-launch capability

functional description of launch vehicles
GAS package
NASA specs
AMSAT modification to basic concept - launch capability
Delta
uncertainty of future launches
ease of compatibility with UoSAT design

Development Environment
design teams
subsystem designs,demonstrations,construction & documentation
systems - protocols, interfaces
software - control, interface, protocol
modem - satellite, ground
RAMUNIT - memory, control, interface
communication links - control, data flow, IF units
spacecraft interface and control
spacecraft team
redesign/modification of UoSAT-1 design
experiment control/loading
RF interface
antenna subsystems
design review teams - spacecraft and experiments

launch/agency liason group
program management and funding/government agencies liason
management team
program manager
project manager
experiment manager
design managers
group leaders
equipment requirements
UO9 ground stations - 3
Phase-III stations - 8
PACSAT stations - 3 regional
12 remote (6 - 20)
construction and test facilities
funding requirements
design support
telecommunications/mail $1000/mo. (reduced with phase-/III station implementations)
travel - in managers' budgets
components $10,000
construction support
ground stations
3 - UO9/PACSAT RF systems $4000
12 - remote RF systems $15000
15 - TNC systems $7000
12 - portable computers (donation)
2 - large personal computers (donation)
associated components $3000
experiment package (2)
integrated circuits $20,000
printed circuit costs $4,000
integration/testing assemblies $2,000
management
program manager & team
travel assistance $20,000
discretionary funding (all categories) $10,000
project manager
2 yr. at $40,000 per
travel assistance $10,000
discretionary funding $2,000
experiment manager
2 yr. at $35,000 per
travel assistance $10,000
discretionary funding $2,000
support
secretarial 1/2-time at $14,000 per year
computer-related and documentation/publicity supplies $6,000
overhead (AMSAT) 4% of salary (telephone & other expenses)

APPENDICES

Technical Requirements
NASA proposal
description of UoSAT packet experiments
description of OSCAR-10 experiments
curriculum vitae of major contributors at AMSAT, UoS & VITA
references

Folks,

the preceeding message is up for discussion. There are lots of assumed and variable thingeys, and several missing items, both in terms of equipment and cost, including perhaps other salary items associated with typical subcontractors. How about some discussions, and lots of fillins in the blanks?

Ben.

[illegible]

Received: Thu Jan 24 1991 7:04 EST
From: GEN
To: email
Subject: NEW relocation

I will be moving in a few hours to a new QTH.
Starting on Monday my
Email address will be
Zack Passerelli ma (1437)
617-433-5187
I'll be off the air for the next 48 hours - see y'all on the flip
side

Posted: Sun Jun 12, 1983 12:21 PM PDT Msg: OGEL-1579-4784
From: VRIP
To: PR
Subj: ALINS PreLaunch #2

PreLaunch ALINS Bulletin for W1AW, W2LV, W2BXA, WA6GFY.
AMSAT's Phase 3B satellite is now fully prepared for launch.
The satellite is mounted atop the Ariane launcher in Kourou,
French Guiana. Launch is scheduled for Thursday, Jun 16th.
The launch window extends from 1159 to 1328 UTC. Again, the
launch is scheduled for June 16th between 1159 and 1328 hours UTC.

The AMSAT Launch Information Network Service will transmit live
reports of progress of the launch as it occurs. Many stations
around the world will relay the audio originating at AMSAT's
command facility in Maryland. Station W1AW will carry the
launch net on all of its normal voice frequencies including
1890, 3990, 7290, 14,290, 21,290 and 28,590 kHz. Other stations
around the world will be on and covering the 80, 40, 20 and 15
meter bands. Frequencies to listen include 3780, 3850, 7080,
7170, 7180, 7182, 14,250, 14,260, 14,265, 14,280, 21,265,
21,280 and 21,285 kHz. Tune to the station you hear best.

Monitor AMSAT net frequencies of 3850, 14,282 and 21,280 in the
days subsequent to launch.

Spacecraft testing will commence shortly after launch. First
AOS will be over Europe and Eastern Africa when the Mode B
beacon is first activated. The
Mode B General Beacon will be heard at 145.810 MHz. The format
will be 5 minutes of CW and 25 minutes of PSK telemetry each
half hour. Telemetry equations are available in Amateur
Satellite Report.

In summary, all is in readiness for the launch this Thursday,
June 16th. The launch window open at 1159 hours UTC. Launch
net operations will commence approximately one half hour prior
to the scheduled launch.

The new OSCAR should be available for general use between 3 and
6 weeks after launch. Tune the AMSAT nets for full details.

[]

TO: HM
FROM: HP
SENT: 15 JUN 83 18:45:52
READ: 15 JUN 83 19:39:07

To: Hank and Mike
Re: 1st Invitational West Coast Linkins Conference

Goal: To provide a forum to discuss the creation of a prototype network to move data and provide a QSO path from San Fransisco to Los Anseles to San Dieso and points in between. The purpose is to set somethins up and runnins to maintain and expand interest in packet radio, not to desisn the ultimate network. Another purpose is to lay the sround work for the sites, RF sear, and frequencies the future networks will require. The disital portion of the network should rely as much as possible on currently available hardware and software.

Dependins on the number of attendees, the location will be either a conference room at my office, or my home QTH. Both of these places are within 5 miles of LAX.

Time and date: 12:00 - ? 7/9/83

The LA sroup will supply transportation to and from the airport for those flyins in.

I'll send out a list of attendees but it looks like the risht people will be here. In addition to NK6K, WA6JPR, and WB6YMH from the local area and hopefully WB6HHV and KA6M, we'll have some folks here from the middle sround between SD and LA as well as someone from between SF and LA.

Brins as many people alons as you like, but try to keep it down to "workins sroup" size.

Lunch will be supplied durins the meetins, and we'll pick a nice place for dinner. I have room to put up a few people overnite but we should be able to wrap thinss up in time for the last flisht out to S.F.

Please confirm your attendence and let me know who else from your areas will attend.

73,
Hamish NK6K

TO: HM
FROM: LSK
SENT: 13 JUN 83 19:07:01
READ: 13 JUN 83 19:34:36

Doug, I have been reading your note of may 7th and trying to see a way to get to work with you, or at least get something going in this area.

All this to no avail I am afraid. The local radio amateurs, the advanced ones at that, are all into getting little boxes for their VIC-20's, Colour Computers etc, to the point were it is no wonder I don't want anything to do with them!!!!! Living here is only one bit better than being in CHINA or somesuch - at least I have PRNET to provide a little sanity to all this garbage locally. For me, I have to say I am out of it. I have terminated everything, including my amateur calls in Canada and don't anticipate getting involved in anything but the following.
#1 - PACSAT, RAMUNIT and what else is needed
#2 - METSCAT, meteor scatter and what that entails, limited to demonstration of working system, then off to other things
#3 - Material collection for a large antenna, broadband, for the farm, in the mid to late 1980's. I am currently hauling home such things as 60 inch on a side tower, 31nch and bigger I beams, miles of 3/8 and 1/2 steel guy cable. This compliments my collection of large diesel generators, arc welder - 400A, and other support tools like a mid sized cat tractor , old truck mounted cherry picker(if I can find one) etc.
I am dreaming of a semi moveable 200-300 ft spherical resource of some sort but what comes will be what I can do with what I have scrounged when it comes time to start construction.
At this point then I dont see myself continuing to pound my head into the local concrete trying to get the locals to do things. I feel so much better since I walked away from the local scene and I find my interests are sharpening rather quickly. For us then I dont see much, the OMEMEE site is being sold, they are offering me the buildings and towers to haul away, and i expect to get several others along highway 7 as well. The company is going to ditch all ths sites that dont fit the digital radio plans and that will put us out of the good sites i am afraid. locally it would be as usual the four or five with everyone else gawking and offering all the advice needed to serve a thousand users-with a total output of zip. I anticipate getting to Toronto on business a few times this summer and fall, will call and hope we can get together but lets not plan on anything up this way - it would just be a waste of both our efforts.

Regards de Larry WA3ZIA

TO: HM
FROM: LJ
[CN]: 13 JUN 83 05:11:21
READ: 13 JUN 83 19:20:06

The followins is sent to you for comment. TAPR has a priority on beginnins work on the hish speed terrestrial linkins hardware and software. A Level 3 protocol is needed. Feedback is needed so we can (1) make the system as close to everyone's perception of wwhat such a system should do as seems practical and (2) set the tasks parsed out. Thanks for your support!

Lele Johnson WA7GXD

President -- TAPR

Proposed Packet Radio High Speed Linkins

Amateur packet radio is currently beins established as a viable mode of communications. Nearly 200 Tucson Amateur Packet Radio (TAPR) Terminal Node Controllers (TNCs) are in the field with the promise of more to come soon. It is believed that on the order of 100 Vancouver TNCs are also in the hands of active packeteers.

The present situation, then, has about 300 stations in about 30 locations communicatins (primarily) on short-rangs VHF frequencies at a signallins rate of 1200 bits per second (bps). Clearly, it would be desireable to establish inter-sroup packet communications. Further, the availability of non-local coverasg would enhance the viability and probable acceptance of packet radio as a primary amateur communications technique.

Recently, some notable experiments have been conducted between the west coast nets of the United States as well as between the US and New Zealand. A channel has been allocated to digital experimentation on the Phase 3R satellite. A packet radio satellite has been proposed and is currently beins desisned by AMSAT. All of these systems are aimed at expandins the seosraphical coverasg of packet radio stations.

One problem with all of these methods is that the achieveable signalling rate is relatively slow. The Phase 3R satellite channel is both bandwidth and power limited, makins a 1200 bps signalling rate about the best we can hope for. HF links are also limited by resulation and ionospheric propasation to a maximum of 1200 baud and typically 100 to 300 baud. PACSAT is primarily a non-real-time system, with a maximum data rate of perhaps 9600 baud.

One of the touted advantases of packet communications is the concept of resource sharins. Conceptually, the simplest of packet stations within rangs of a sophisticated network

station should be able to use the resources of the sateway to extend its own coverase, somewhat akin to the user of a handheld VHF ris using a mountaintor repeater, or am autoratch, to extend his coverase.

While AMSAT is concentratins its resources in the develorment of satellite techniques, and AMRAD is workins on an adaptive modem desisn for hf use, TAPR has committed itself to the develorment of hish-speed UHF/microwave linkins equirment. This concert is not new, but it is new within the Amateur radio environment, and that same environment places unique constraints on the equirment itself. The remainder of this raper will address the system requirements followed by sussested arproaches to implementation.

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TOPOLOGY

The current racket centers of operation are widely scattered seosraphically, and widely separated from one another in terms of VHF coverase. The ratterns that seem to emerse are senerally consistent with ropulation density. It may be that, as racket radio takes hold, its station distribution will more closely alisn with the seneral ropulation distribution.

Present centers of activity include San Francisco, Los Anseles, San Dieso, Phoenix, Tucson, Colorado Sprinss, St. Louis, Little Rock, Chicaso, Minneapolis, Racine, Ann Arbor, Indianapolis, Dayton, Washinston DC, New Jersey, Connecticut, eastern Massachusetts and Florida. In addition, there is activity in Vancouver, Hamilton, upstate New York and expected activity in Dallas, Atlanta and North Carolina.

It can be seen that some sites could conceivably link usins UHF frequencies with little trouble, such as LA/San Dieso and Phoenix/Tucson. Other sroups could link via one or two additional hops, such as LA/San Francisco, San Dieso/Tucson, St. Louis/Little Rock, St. Louis/Chicaso, Chicaso/Racine, Chicaso/Ann Arbor, etc. As more activity develops, more sites could, and presumably would, link into this web.

Asain lookins at the above examples, it is clear that some centers tend to form a hub, such as Chicaso, St. Louis and San Dieso. Fortunately, these sites include some of the most active and enthusiastic racket sroups.

SYSTEM OBJECTIVES

In order to link these existing sites, and allow for anticipated growth, some estimate of traffic offered the system must be made, and acceptable traffic delays estimated. The excess capacity needed for throughput delay can then be factored in and a goal defined.

If we assume that (1) packet activity is going to explode in the next five to ten years (from, say, 300 users now to 3000 in five years and 15000 in ten), (2) that the increasing presence of computers in the ham shack is a trend and not a fad and (3) traffic nets will take advantage of fast, reliable means of communications when available, then the traffic offered the system will likely be enormous in a few years time.

On the average, an active packeteer may be expected to operate a few nights a week, and will likely be accessing local bulletin boards and other local activities. He may attempt conversation with other stations in the larger network, or participate in multiparty nets a couple of nights a week. If he is on an hour a night, he may generate a few thousand characters of data. While all of this is

somewhat nebulous, if used as a rough guide, our typical packeteer may offer the larger network upwards of 10,000 bytes/hour in bursts, but only about 400 bytes/hour average on active days, or about 100 bytes/hour on long term average. This is well under 1 baud.

At the present packet population, this means the network may be offered a peak burst rate of 3,000,000 bytes/hour (about 50,000 bytes/min or about 6600 baud). In five years this can be expected to increase by an order of magnitude to about 66 kilobaud and in ten years to around 330 kilobaud. Naturally, this assumes that everyone is on at once and wants to use the network at the same time -- not likely, but a yardstick.

If we assume that the more sophisticated Amateurs will take advantage of packet radio's data integrity to ship lengthy files, as opposed to RTTY-like chit-chat, the system loading will increase even more dramatically. If every packeteer were to try to back up his winchester disk, the system could experience severe constipation almost immediately!

In order to reduce system delays, it is common to design in excess capacity so that the system is lightly loaded. From the above, assuming the users not on the system are compensated for by the file-dumpers, it would appear that a capacity to handle upwards of 50 kbaud is desireable for the "trunks" to meet the five-year demand, and this is to be taken as a minimum. 250 kbaud would be better.

A final assumption is that, as activity picks up, parallel trunks may be established, much as VHF FM repeaters often have similar coverage to reduce the loading on any specific machine.

HARDWARE REQUIREMENTS

Based on the above topological and loading considerations, the following specifications are offered as a guide in implementing a high speed Amateur packet radio linking system.

Each relay link will operate on 220 MHz or above. The FCC allows us a 100 kHz data bandwidth on this band. Above 1215 MHz, bandwidth does not become a practical limitation. If a 50 kbaud link is to be built, 220 MHz is recommended for the following reasons:

1) Rf gear is easily built for this frequency.
2) Rf gear is cheap at these frequencies.
3) Rf gear for these frequencies can be easily maintained.
4) The 100 kHz bandwidth limitation will easily accomodate 50 kbaud. Use of fairly sophisticated modulation techniques could realistically extend this data rate to around 200 kbps.

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If significantly higher data rates are otherwise practical, L-band (1215 MHz) is sussested due to less crowding than 440 MHz and no practical bandwidth limitations. Equipment for this band is not cheap, however, and the rf circuitry is not as easily maintained (perhaps due to lack of familiarity with microwave techniques by most Amateurs).

Topology sussests that the high speed equipment be multiport to efficiently handle an n-way branch. Further, an input port is needed for the local area to have access. Provision for up to four high speed channels is sussested.

In the interests of (1) spreading the design task around and (2) flexibility a modular design is proposed. The modules are as follows:

1) Rf deck. This is to be a sinsle-channel, crystal-controlled unit of about 10-watts power output, class C, well protected from antenna faults and the like. The transmitter will accept an if signal at 10.7 MHz. The reciver will be controlled by the same oscillator and have an output of 10.7 MHz.

2) If deck. This is to contain the modem. It will accept the necessary logic signals and convert them to a modulated signal at 10.7 Mhz. Similarly, the incoming if signal at 10.7 Mhz will be decoded to the proper logic level output(s).

3) Digital deck. This unit will contain the microprocessor, memory and logic-level I/O ports. Due to the speeds involved, a fast 16-bit processor is suggested. Possible candidates include the 68000 or perhaps the 8086. Software development tools are a real consideration here. The memory should be large enough to buffer the incoming channel(s) traffic. If half-duplex operation is required, then it must store up to 4 channels' worth at the maximum data rate until channel turnaround. It may be that the controlling software will be RAM-resident with some sort of bootstrap circuit. It is proposed that the RAM be on the order of 1/4 megabyte, error-detecting, and sufficient bytewide sockets be provided for up to 64 k bytes of EPROM. If full duplex operation is instead used, the buffering requirements may be lessened and system RAM on the order of 64k to 128 k bytes may be acceptable.

In addition, the equipment must be easily duplicable, maintainable and cost effective. It is anticipated that local groups will support their machine in much the same fashion as repeater groups support repeaters. This equipment doesn't have to be designed to be financed and supported by a single individual, and a total cost ceiling may be on the order of $1500 to $2000. To this must be added the costs of power, access, antennas, site fees and so forth.

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SOFTWARE CONSIDERATIONS

Higher level protocols have not yet been defined for Amateur packet radio. The first high-speed linking devices will of necessity be test-beds for protocol experimentation, and therefore must be very flexible. It is not inconceivable that software development tools may best reside on the digital unit itself, along with mass storage. Once things are defined and the network grows, the sophistication of the "linker" may be reduced by the removal of such features.

Alternatively, the linker may be tightly coupled to an accessable development system with upload/download capabilities for fast turnaround during the development cycle. It is not practical to assume that the linker itself will be easily accessable if it is in routine maintenance

coverage.

Any language selected should be capable of (1) support and (2) efficient compilation. The linker may have to perform routing decisions and do so during peak traffic conditions; so slow or inefficient algorithms or compilers may not work.

IMPLEMENTATION

It is suggested that this paper be circled around, counter-proposals made, investigations into modulation techniques and hardware be undertaken, and in general discussion be entered by those with an interest. After some finite period, hopefully on the order of two or three months, TAPR should make some definite decisions and begin the design task.

By modular design, various hardware systems can be designed at various TAPR and TAPR-affiliated sites. Similarly, the software effort must be coordinated and tasks passed around to those with the ability to help. It is expected that TAPR will coordinate the efforts of the volunteer sites.

We have witnessed the birth of a new era in Amateur radio communications. It is up to us to assure its health and growth. "PACLINK" is needed. TAPR possesses the necessary skills and motivation to implement it. An opportunity to have a lasting impact on Amateur radio beckons, and we must once again rise to the challenge.

To: All Packet Stations
From: Hank Magnuski
Date: 7 June 1983

Subject: KA6M Repeater Revision 5.01

The software in the KA6M repeater has undergone a major upgrade, implementing changes in these three areas:

1. Command Mode
2. Link Level multi-hop repeating
3. Level 3 multi-hop repeating

The following is a description of these changes:

1. Repeater Commands

A station can now issue commands to the repeater which will be executed and produce a response. A frame which is a repeater command must have KA6M-2 in the 'to' address field and the text must start with '!' followed by the two characters of the command (in upper or lower case). Frames addressed to the repeater will not be repeated, even if they are not valid commands. To initialize the 'to' field,

on the TAPR: type UNPROTO KA6M-2
on the VADCG: type KA6M 2^^C and then enter your command
(the board will try to connect and time out)

Valid commands for users:

!br - Beacon request. Sends out a copy of the beacon messages. The status line and optional message line will be included.

!ab - Quick brown fox test request. Sends 40 lines of fox messages. Can be used as a path-quality test.

!nl - Null test request. Sends out 40 packets of 120 nulls. This test is ideal for checking for receive distortion, for adjusting receive modem levels, checking modem operation, for measuring RF levels, aligning antennas, etc.

Valid commands for the control operator:

!bf - Disable the 10 minute beacon. Repeater is on but runs silent.

!bt - Enable the beacon.

!ip - Load an entry in the IP/TCP static routing table.

!ms - Setup or reset the message-of-the-day beacon text.

!rf - Disable the repeater's repeat function.

!rt - Enable the repeater's repeat function

Users are requested to not use the !nl and !ab commands during busy periods, as it ties up the channel for everyone for a significant period of time.

2. Link-level Multi-hop

Support is now provided for link-level multi-hop as implemented in the TAPR software. To utilize this facility you must specify multiple repeaters in your connect command. Example:

CONNECT KA6M VIA ,,,,KA6M-2,,,,

3. Level 3 Multi-hop

Some experimental code for trying out IP/TCP type protocol packets has been included in this revision of the repeater software. The repeater has an internal static routing table which can convert an IP destination address to an outgoing link level repeater callsign. The routing table can be dynamically changed or reloaded from the control operator station. More about this facility will be written when additional testing has been completed.

TO: [illegible]
FROM: PLR
SENT: 02 JUN 83 21:53:22
READ: 02 JUN 83 22:20:52

To : All Packeteers
From : Paul Rinaldo, W4RI (ARRL HQ)
Subject: FCC Relaxes Rules -- No need to cw i-d on packet

We received the verbatim text of an FCC release of yesterday. Although individual packet stations are relieved of the need to send cw i-d, I would certainly encourage the retention of cw i-d for all packet repeaters and packet beacons. That would help packeteers tell which repeaters are available to them and would help propagate the faith to current non-[illegible].

Here it is:

Before the
Federal Communications Commission FCC 83-247
Washington, DC 20554 33301

In the Matter of)
)
Amendment of Part 97 of the)
Commission's Rules Pursuant to the)
Commission Regulatory Review)
[illegible]

ORDER

Adopted: May 26, 1983 Released: June 1, 1983

By the Commission: Commissioner Fogarty not participating;
Commissioner [illegible] absent

1. Pursuant to the Commission's Regulatory Review program, the rules addressed herein are being amended or deleted, as appropriate, in order to eliminate unnecessary restrictions and rules, codify requirements of the Communi cations Act of 1934, as amended, or make editorial correc tions necessary for simplifiction or clarification of the rules. The affected rule sections are: ~ 97.13, [illegible] 97.61, 97.69, 97.81, 97.84, 97.99 and 97.173.

2. We are deletins ~ 97.32(f), which currently proh bits the renewal of Interim Amateur Permits, since renewal may be justified in circumstances where there is an extra ordinary delay in the issuance of permanent amateur operator and station licenses.

3. We are revisins ~ 97.13(c) and ~ 97.13(d) to cor rect an omission in order that amateur operator license renewal applicants may submit a photocopy of their license in place of the orisinal document. We [illegible] 97.67(a)(3), and revising ~~ 97.61(e), 97.69(a)([illegible] 97.67(b)(3) in order to rectify certain unintentional [illegible] sistencies in our recent Order authorizins the [illegible]

digital code "AMTOR" on Amateur Radio Service frequencies below 50 MHz. /1/ We are revising ~ 97.99 to delete the reference to the obsolete Form 452-C. We are also revising ~ 97.173(d) to change the incorrect reference to ~ 97.41 to the correct reference, ~ 97.42.

4. We are adding a new paragraph to ~ 97.81 which codifies into the rules the existing requirements of the Communications Act of 1934, as amended, that specify that the Commission has the "...authority to inspect all radio installations ... which are subject to the provisions of any Act, treaty, or convention...." /2/ This amendment also codifies longstanding Commission policy in that the author ity to inspect amateur radio stations is a general condition of grant of all amateur licenses.

5. Finally, we are revising ~ 97.84 to allow station identification for amateur stations to be made by video when specific transmission standards are used, or, under some circumstances, by using certain commercial codes. This will relieve a number of burdens amateur operators have faced when required to identify "packet radio" transmis sions, television transmissions where audio cannot be prac tically transmitted on the same operating frequencies, and transmissions where international third party traffic is exchanged and identification of the station being communi cated with is required. /3/

6. We are dispensing with the prior notice and comment procedure provisions of the Administrative Procedure Act (APA) in this proceeding since the amended rule changes are either interpretative (~~ 97.13, 97.69, 97.81, 97.99) or relate to agency procedure (~ 97.32), or since it is unlike ly that any objections would be received in view of the obvious benefits which are being conferred and we, there fore, find it unnecessary (~~ 97.61, 97.69, 97.84, 97.99). /4/ The APA's effective date requirements are also not applicable to these rule amendments because they either relieve a restriction, or are interpretative. /5/ Certain rule changes also addressed merely make editorial correc tions and the APA, therefore, does not apply (~ 97.173).

7. Inasmuch as general notice of proposed rule making is not required, the Regulatory Flexibility Act of 1980 does not apply.

8. Accordingly, IT IS ORDERED That, effective June 15, 1983, Part 97 of the Commission's Rules and Regulations, 47 CFR Part 97, IS AMENDED as set forth in the attached Appen dix. This action is taken pursuant to authority contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended. Further information on this matter may be obtained by contacting: Maurice J. DePont, (202) 632-4964, Federal Communications Commission, Private Radio Bureau, Washington, DC 20554.

FEDERAL COMMUNICATIONS COMMISSION

William J. Tricarico
Secretary

Attachment: Appendix

/1/ 48 FR 7457 (February 22, 1983).

/2/ See Section 303(n) of the Communications Act of 1934, as amended.

/3/ Article 25, ¶ 5 of the International Radio Regulations (Geneva, 1979) permits identification signals in the form of, among others, "a telegraph code compatible with conventional printing equipment." Furthermore, the television emissions which we are authorizing to be identified by video are those which can only take place on frequencies where international propagation is unlikely.

/4/ See 5 U.S.C. 553(b)(3).

/5/ See 5 U.S.C. 553(d).

APPENDIX

Part 97 of the Commission's Rules and Regulations, 47 CFR Part 97, is amended as follows:

1. In Section 97.13, paragraphs (c) and (d) are revised to read as follows:

¶ 97.13 Renewal or modification of operator license.

(c) Application for renewal and/or modification of an amateur operator license shall be submitted on FCC Form 610 and shall be accompanied by the applicant's license or a photocopy thereof. Application for renewal of unexpired licenses must be made during the license term and should be filed within 90 days, but not later than 30 days, prior to the end of the license term. In any case in which the licensee has, in accordance with the provisions of this [illegible] and sufficient application for renewal of an unexpired license, no license with reference to any activity of a continuing nature shall expire until such application shall have been finally determined.

(d) If a license is allowed to expire, application for renewal may be made during a period of grace of five years after the expiration date. During this five-year period of grace, an expired license is not valid. A license renewed during the grace period will be dated currently and will not be backdated to the date of its expiration. Application for renewal shall be submitted on FCC Form 610 and shall be accompanied by the applicant license or a photocopy thereof.

2. In Section 97.32, paragraph (f) is deleted in its entirety.

3. In Section 97.61, the parenthetical phrase in paragraph (e) is revised to read as follows:

(when type F1 or A2J emissions are employed in these bands, the radio or audio frequency shift, as appropriate, shall not exceed 1000 Hz)

4. In Section 97.69, paragraph (a)(3) is deleted in its entirety and paragraphs (a)(2) and (b)(3) are revised to read as follows:

" 97.69 Digital communications.

(a) * * *

(2) When type A2, F1 or F2 emissions are used on frequencies below 50 MHz, the radio or audio frequency shift (the difference between the frequency for the "mark" signal and that for the "space" signal), as appropriate, shall not exceed 1000 Hz. When these emissions are used on frequencies above 50 MHz, the frequency shift, in hertz, shall not exceed the sending speed, in baud, of the transmission, or 1000 Hz, whichever is greater.

(b) * * *

(3) The International Radio Consultative Committee (CCIR) Recommendations 476-2 and 476-3 (commonly known as AMTOR); provided that the code, baud rate and emission timing shall conform to the specifications of CCIR 476-2 (1978) or CCIR 476-3 (1982), Mode A or Mode B.

5. Section 97.81 is revised to read as follows:

" 97.81 Authorized apparatus.

(a) An amateur station license authorizes the use, under control of the licensee, of all transmitting apparatus at the fixed location specified in the station license which is operated on any frequency or frequencies allocated to the Amateur Radio Service, and, in addition, authorizes the use, under control of the licensee, of portable and mobile transmitting apparatus operated at other locations.

(b) The apparatus authorized for use by paragraph (a) of this section shall be available for inspection upon request by an authorized Commission representative.

6. In Section 97.84, paragraph (a) is revised to read as follows:

" 97.84 Station identification.

(a) The identification required by this section shall be given on each frequency being utilized for transmission and shall be made in one of the following manners:

(1) By telegraphy using the international Morse code (if this identification is made by an automatic device used only for identification, the code speed shall not exceed 20 words per minute);

(2) By telephony using the English language (the Commission encourages the use of a nationally or internationally recognized standard phonetic alphabet as an aid for correct [illegible]

(3) By telegraphy using any code authorized by ~ 97.69(b), when the particular code is used for transmission of all or part of the communication or when the communication is transmitted in any digital code on frequencies above 50 MHz; or

(4) By video using readily legible characters when A5 emissions are used, the monochrome portions of which conform, at a minimum, to the monochrome transmission standards of ~ 73.682(a)(6) through ~ 73.682(a)(13), inclusive (with the exception of ~ 73.682(a)(9)(iii) and ~ 73.682(a)(9)(iv)).

7. In Section 97.99, the introductory paragraph is revised to read as follows:

~ 97.99 Stations used only for radio control of remote model crafts and vehicles.

An amateur radio station in radio control operation with a mean output power not exceeding one watt may, when used for the control of a remote model craft or vehicle, be operated under the special provisions of this section, provided that a writing indicating the station call sign and licensee's name and address is affixed to the transmitter.

8. In Section 97.173, paragraph (d) is revised to read as follows:

~ 97.173 Application for RACES station license.

(d) If the application is for a RACES station to be in any special manner covered by ~ 97.42, those showings specified for non-RACES stations shall also be submitted.

Posted: Mon May 30, 1983 7:09 PM PDT Mss: WGEK-1573-9962
From: TCLARK
To: packsat
Subj: More US-ZL Packet Radio happenings

On the long-distance packet work, WA2LQQ and W3IWI took the opportunity of the Memorial Day holiday to try again with ZL1AOX. This time we tried running at 600 Baud. W3IWI did connect, but had local QRM. WA2LQQ's bigger signal won out, and Rip & Ian went at it for an hour, with Ian even sending a file to Rip. In Washington, K1HTV/KA1GD were SWLing and copied packets from Ian. Here is a bit of what went on:

```
cmd:hb
HBAUD    7
cmd:i

cmd:     $
EH?
cmd:c zl1aox
cmd:frame read
00-AE826498 A2A260B4 9862829E B06148F0     WA2LQQ0ZL1A0X0$x   ..d...`..b...aH.
10-69732074 68617420 6F6B0D                49.:40:.75.        is that ok.
ZL1A0X>WA2LQQ:is that ok

frame read
00-AE826498 A2A260B4 9862829E B0616AF0     WA2LQQ0ZL1A0X05x   ..d...`..b...aj.
10-6F6B2072 69700D                         75.948.            ok rip.
ZL1A0X>WA2LQQ:ok rip

frame read
00-AE826498 A2A260B4 9862829E B0616AF0     WA2LQQ0ZL1A0X05x   ..d...`..b...aj.
10-6F6B2072 69700D                         75.948.            ok rip.
ZL1A0X>WA2LQQ:ok rip

frame read
00-AE826498 A2A260B4 9862829E B06168F0     WA2LQQ0ZL1A0X0Ax   ..d...`..b...ah.
10-69732074 68617420 6F6B0D                49.:40:.75.        is that ok.
ZL1A0X>WA2LQQ:is that ok

frame read
00-AE826498 A2A260B4 9862829E B06166F0     WA2LQQ0ZL1A0X03x   ..d...`..b...af.
10-72697020 69207769 6C6C2074 72792074     948.4.;466.:9<.:   rip i will try t
20-6F207365 6E642061 2066696C 6520746F     7.9272.0.3462.:7   o send a file to
30-20796F75 0D                             .<7:.              you.
ZL1A0X>WA2LQQ:rip i will try to send a file to you
```

etcetera.....

Today we moved up to 28.300 to avoid the beacon band. I was also experimenting with slight modifications to the TAPR TNC. Temporarily installed a LED (with 180 ohm pullup) parallel to R18, to show the Carrier Detect activity -- Strongly advise this mod for all!! The audio level is VERY critical with weak signals. This LED should be on solid with signal present and only flash occasionally with no signal.

Also with the 600 Baud rate, I helped things out by increasing C10 by paralleling 0.22 uf to improve lock & CD in the presence of fading. Was also experimenting adding .0015 uf across C11 when

the band folded up.

73, Tom

TO: HM
FROM: TC
SENT: 31 MAY 83 03:10:34
READ: 31 MAY 83 05:31:33

Hank, we had been using 28.220, but had some complaints on that being beacon turf. Today we tried 28.300, and probably will go up from there a bit in the future. For me, I'll be in California (Barstow) from next weekend thru the end of June, so my activities have come to a screeching halt. I do think that the 10m paths are vy good amicon training activities. The problems are a bit different, but similar enuff to be relevant.

Tom

TO: HM
FROM: TC
SENT: 30 MAY 83 04:57:36
READ: 30 MAY 83 16:19:30

The followins messases are relayed from AMSAT's network on GTE TeleMail for makins sure PRNET people are up to date on Phase-3B launch activities. If you wonder why WA2LQQ is playins the "Voice of AMSAT" role instead of me, I have to be in California the entire month of June on work (I just love beautiful downtown Barstow!). However, W3IWI/6 will be on from my facility at Goldstone with KWM380 and 7-30 MHz LPA beam at 70' -- I may be remote but I shall not be silent!!

73 de W3IWI

- -

Posted: Mon May 30, 1983 2:28 AM GMT Mss: CGEK-1573-9214
From: RZWIRKO
To: amsat
Subj: New Launch date
Jan Kins, operatins FYOESE at Kourou announced that it appears that the launch of our Phase 3-B will be moved up by one day to Wednesday June 15th. For more info please read "W3GEY/FYOESE Update" on the ENG bulletin board.

73, Rich K1HTV

- -

Posted: Mon May 30, 1983 3:48 AM GMT Mss: LGEK-1573-9249
From: RWALLIO
To: ops
Subj: ALINS plans
Followins is the PHASE IIIB ALINS schedule based on a June 15-18 launch:

Pre- and post-launch bulletins:

- Pre-launch bulletins start June 11 UTC
- Post-launch bulletins end June 19 UTC
- Bulletin text by WA2LQQ and posted on this BB

Eastbound from eastcoast USA via W2BXA and W2LV

1800 UTC	21.280 MHz	Europe
1805	21.280	Africa
1815	14.280	Europe
1820	14.280	Africa

Westbound from westcoast USA via WA6GFY

1900 UTC	21.280 MHz	VK-ZL
1910	14.280	VK-ZL
2300	21.280	JA-DU
2310	14.280	JA-DU

USA coverase via W1AW

Normal W1AW bulletin frequencies, times and modes

UK-Europe from G3AAJ

Starting June 9 at 1800 UTC on 3.780 MHz

Launch day realtime teleconference net:

- Individual net operations could start as early as 1 hour before launch window opens but long distance calls to teleconference bridge should not be made until 30 minutes before window opens.

- Teleconference should be broken approximately 30 minutes after launch (orbital insertion will occur approximately 15 minutes after launch). Individual nets should continue as long as questions need to be answered.

- Information inputs to teleconference bridge will include WA2LQQ acting as the "VOICE OF AMSAT" from Goddard Space Flight Center and K1HTV operating WA3NAN who will be in touch with Kourou via HF link.

ALINS broadcast stations:

W1AW Newington, Conn.
1.890 3.990 7.290 14.290 21.390 28.590 50.190 147.555
(standard W1AW voice bulletin frequencies)
All transmissions intended for USA coverage

WORPK Des Moines, Iowa
3.850 MHz

NOAN Ames, Iowa
7.180 MHz
(Audio feed from WORPK via KOCY 146.01/.61 repeater

AIOZ Ames, Iowa
14.260 MHz
(Audio feed from WORPK via KOCY 146.01/.61 repeater

WA6GFY San Francisco, CA.
7.170 MHz
14.250
Both transmissions intended for USA coverage

WA3TAI Washington, D.C.
14.280 MHz
21.280
Both transmissions beamed toward Europe/Africa

G3AAJ UK
7.080 MHz
UK-Europe coverage

G3RWL UK
3.780 MHz
UK coverage
(U of S command station will call teleconference bridge and link audio to G3AAJ via 70cm who will link to G3RWL via 2M)

WH6AMX Hawaii

7.182
14.265 (Japan)
14.285 (VK-ZL)
(Information on actual station calls will follow)

AMSAT will follow normal net schedule before launch. Nets will be run on 75M every night following launch through following Tuesday. Use normal time and frequency schedule. A special 15M/20M net should be run on Saturday following the standard Sunday schedule. Stations should maintain a watch on 21.280 and 14.280 to respond to info requests.

- -

Posted: Sun May 29, 1983 6:49 PM GMT Mss: SGEK-1573-9022
From: PKARN
To: ens
Subj: W3GEY/FY0ESE Update
Had QSO with Jan King operating FY0ESE this morning. For most of the contact, conditions were excellent, practically telephone quality. WA2LQQ and K1HTV (operating WA3NAN) were also on frequency. For the first time in a long while, Pip was not the strongest station that I could hear, in fact he was barely audible!

Jan passes the following launch window, orbital, etc., info:

The mission reference mark, called "H0", is defined as 1st stage ignition time, not liftoff, which is 3.4 seconds later. The launch date is now likely to be moved up a day to 15 June; windows follow:

15 June 83 11:59:00 UTC -> 13:28:00 UTC
16 June 83 (same)
18 June 83 00:53:00 UTC -> 02:21:00 UTC (night window)

The launch windows are the result of the following ECS-1 criteria:
1. No eclipse between true anomaly 70 and 190 degrees.
2. No eclipse anywhere in the orbit that lasts longer than 30 minutes.
3. Solar aspect angle on the ECS-1 solar panels must be between 85 and 115 degrees.
4. An interval meeting the above criteria must be at least 45 minutes long to be considered a launch window.

The night window on the 18th has to do with launch crew sleep schedules. I also suspect that it will avoid a conflict with STS-7 later in the same day.

Elements for the time of ECS-1 separation (H0+944.53 sec) are:

Semi Major Axis: 24,416.258 km
Eccentricity: .730584
Inclination: 8.602 deg
Argument of Perisee: 177.896
True anomaly: 8.897 deg
Mean anomaly: .948983 deg (note: I computed this from the true anomaly)
RAAN: computed as Omega-sub-s + GSTi, given as:

Omega-sub-s: 161.42634 deg (longitude of ascending node with respect to Greenwich at injection time)
GSTi: 248.91120 + 360.985647335*d, d = decimal days since 1 June 00 UTC. (Greenwich Sidereal Time at Injection)

The latter formula may look confusing, but it accounts for the rotation of the earth. 248.91120 is simply the sidereal time at Greenwich at 1 June 00:00:00 UTC, while 360.985647335 is the earth's rotational rate in degrees per solar day. These numbers will be slightly different for us due to orbit perturbations caused by the third stage's attitude control system during spin up, reorientation, etc, since we're getting kicked off last.

Jan says that they've got the "neatest spacecraft we've ever had", without even a hint of any problems. They've trickle charged and conditioned the batteries for the first time in 6 months, with nominal results. Two flight qualified inertial guidance platforms are on hand for the launcher, and a successful third-stage turbopump test has been completed. Phase 3-B kick motor fueling begins tomorrow starting with the oxidizer (nitrogen tetroxide), followed by the fuel (unsymmetrical dimethyl hydrazine) on the following day.

73,
Phil

TO: HM
FROM: TC
SENT: 30 MAY 83 04:36:57
READ: 30 MAY 83 16:14:29

Thought I'd share some of the 10 meter happenings with y'all --
The followings are two files I prepared for dissemination:

So that some of you can share the packet radio activities of today, here is part of the W3IWI-ZL1AOX QSO. Ian also worked N5AHD and N6TE, I am told. WA2LQQ was also trying (very trying).

cmd:bt
BTEXT Packet Radio Test de W3IWI
QRV? ZL1AOX,ZL1WN,N5AHD,W1HDX,WA2LQQ,???
29 May 1983

Then at about 20:40 UTC:

cmd:b
BEACON EVERY 2
cmd:txd
TXDELAY 3
cmd:txd
TXDELAY 8
cmd:c zl1aox
cmd:b e 6
beacon EVERY 2
cmd:i
cmd:trace $f5ff
was $1000
cmd:i
cmd:i
Link state is: CONNECT in progress
cmd:i
cmd:frame read
00-AE6692AE 924060B4 9862829E B06163 W3IWI 0ZL1AOX01 .f...@`..b..ac
frame used
00-AE6692AE 924060B4 9862829E B06163 W3IWI 0ZL1AOX01 .f...@`..b...ac
*** CONNECTED to ZL1AOX
frame read
00-AE6692AE 924060B4 9862829E B0612F W3IWI 0ZL1AOX0. .f...@`..b...a/
frame used
00-AE6692AE 924060B4 9862829E B0612F W3IWI 0ZL1AOX0. .f...@`..b...a/
frame read
00-AE6692AE 924060B4 9862829E B06163 W3IWI 0ZL1AOX01 .f...@`..b...ac
frame used
00-AE6692AE 924060B4 9862829E B06163 W3IWI 0ZL1AOX01 .f...@`..b...ac
cmd:trace 0
was $F5FF
cmd:conv

ZL1AOX>BEACON:tW3IWI, N5AHD - Tnx fer your report on telemail. I hope that copy will be better today on Packet Radio. 73... Ian..
asl beacon xmission too
*** CONNECTED to ZL1AOX
ZL1AOX>W3IWI:hi tom

hi tom

hi ian, how copy?
it isn't great, but here we are

```
did I hear darryl's call too?
cmd:i
cmd:conv
cmd:i
cmd:i
cmd:trace $f5ff
was  $00
cmd:axd 10
was  3
cmd:txd 10
was  8
cmd:conv
set AXD 10 & TXD 10, RETRY 0

          Then around 02:15


cmd:c zl1aox
cmd:i a 0
was RETRY 2
cmd:i
cmd:frame read
00-AE6692AE 924060B4 9862829E B06100F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-68692074 6F6D0D                         hi tom.            hi tom.
ZL1A0X>W3IWI:hi tom

frame used
00-AE6692AE 924060B4 9862829E B06100F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-68692074 6F6D0D                         hi tom.            hi tom.
c
Link state is: CONNECT in progress
cmd:frame read
00-AE6692AE 924060B4 9862829E B06106F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-0D                                      .                  .
ZL1A0X>W3IWI:

frame used
00-AE6692AE 924060B4 9862829E B06106F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-0D                                      .                  .
d  (note -- he thought we were connected, but I didn't)
cmd:retry count exceeded
***disconnected
c zl1aox
cmd:frame read
00-AE6692AE 924060B4 9862829E B06106F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-0D                                      .                  .
ZL1A0X>W3IWI:

frame used
00-AE6692AE 924060B4 9862829E B06106F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-0D                                      .                  .
frame read
00-AE6692AE 924060B4 9862829E B06100F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-68692074 6F6D0D                         hi tom.            hi tom.
ZL1A0X>W3IWI:hi tom

frame used
00-AE6692AE 924060B4 9862829E B06100F0     W3IWI 0ZL1A0X0.x   .f...@`..b...a..
10-68692074 6F6D0D                         hi tom.            hi tom.

frame read
```

```
00-AE6692AE 924060B4 9862829E B06104F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-616E6420 6A757374 20676F74 20626163     072.5:9:.37:.101    and just sot bac
20-6B0D                                    5.                  k.
ZL1AOX>W3IWI:and just sot back

frame used
00-AE6692AE 924060B4 9862829E B06104F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-616E6420 6A757374 20676F74 20626163     072.5:9:.37:.101    and just sot bac
20-6B0D                                    5.                  k.
frame read
00-AE6692AE 924060B4 9862829E B06102F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-69206A75 73742077 656E7420 6F757420     4.5:9:.:27:.7::.    i just went out
20-666F7220 61207768 696C650D              379.0.:4462.        for a while.
ZL1AOX>W3IWI:i just went out for a while

frame used
00-AE6692AE 924060B4 9862829E B06102F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-69206A75 73742077 656E7420 6F757420     4.5:9:.:27:.7::.    i just went out
20-666F7220 61207768 696C650D              379.0.:4462.        for a while.
frame read
00-AE6692AE 924060B4 9862829E B06104F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-616E6420 6A757374 20676F74 20626163     072.5:9:.37:.101    and just sot bac
20-6B0D                                    5.                  k.
ZL1AOX>W3IWI:and just sot back

frame used
00-AE6692AE 924060B4 9862829E B06104F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-616E6420 6A757374 20676F74 20626163     072.5:9:.37:.101    and just sot bac
20-6B0D                                    5.                  k.
frame read
00-AE6692AE 924060B4 9862829E B06163       W3IWI OZL1AOX01     .f...@`..b...ac
frame used
00-AE6692AE 924060B4 9862829E B06163       W3IWI OZL1AOX01     .f...@`..b...ac
*** CONNECTED to ZL1AOX     (note ---- FINALLY)
frame read
00-AE6692AE 924060B4 9862829E B06102F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-69206A75 73742077 656E7420 6F757420     4.5:9:.:27:.7::.    i just went out
20-666F7220 61207768 696C650D              379.0.:4462.        for a while.
ZL1AOX>W3IWI:i just went out for a while

frame used
00-AE6692AE 924060B4 9862829E B06102F0     W3IWI OZL1AOXO.x    .f...@`..b...a..
10-69206A75 73742077 656E7420 6F757420     4.5:9:.:27:.7::.    i just went out
20-666F7220 61207768 696C650D              379.0.:4462.        for a while.
```

Note -- you can see there were a LOT of retries !!!! It could be very useful to have a command which says "He thinks we are connected, but I don't. Trick my TNC to believe it is connected too"

And now some hints and kinks:

And now some hints and kinks on using the TAPR board in a noisy (e.g. HF FSK) environment:

(1) It is VERY easy to set too much audio into the the board. This will have the effect of forcing the 2211 demodulator's carrier detect to the state that the HDLC chip thinks a carrier is present all the time.
Cure: run less audio.

Diagnostic: Look at pin 5 of the 2211 (U18) -- it's easiest to set at the 4.7k resistor. Set RX audio level so this line is pulsing low about 10% of the time. I'll bet you were low nearly all the time! It's also useful to look at the comparator input (2211 pin 3 =R17/C10). Set RX audio so you are idling about 30-50% of the Vref voltage on 2211 pin 10. Would STRONGLY suggest that you add a LED indicator on Pin 5 = !CD -- this is much more useful for setting audio level than the audio indicator LED's.

(2) Tuning: Tuning is not easy. Typical HF rigs are not well equalized, and I found tuning very critical. You can use a scope on 2211 Pin 8 to help in the tuning. Here I find that the 1200 Hz tone corresponds to about 5.5 volts and the 2200 Hz tone to about 2.5 volts. The no signal idle condition is near the 1200 Hz tone end. I tried to improve equalization by using IC720's PBT to center this voltage in the tuning range when listening to noise.

(3) Proceedures:

Unlike FM links, you must be prepared for a lot of retries -- With the Beta 2*1 software, I run RETRY 0.

Keep packets short (I'd suggest PACLEN no more than 64, perhaps 32).

To help in tuning, some extra noise at the start is nice -- try using TXD and AXD both 10.

Send extra ID's as a tuning & feedback aid to the other fellow -- I would send 2 or 3 id's in a row to indicate that conditions were picking up.

On a pre-arranged basis, you might try lower baud rates. 400 (HBAUD 10), 600 (HBAUD 7), and 800 (HBAUD 11) might be interesting.

Use the BEACON feature to keep the frequency busy. I was running BEACON EVERY 2 much of the weekend. Don't hesitate to try CONNECT -- it also keeps the channel occupied vy nicely.

(4) It sure would be nice if we could work SSB and packets on the same freq -- would make tuning much easier! Den was going to try to wrk on the FCC about some relaxed rules interpretations, and he might work on this one!

(5) It will be very interesting to hear reports on how well people do with other modems. Based on my 400 Baud PSK experience, a lot of Ian's transmissions SHOULD have been copyable. I expect that those with Phase-3B PSK modems (W3IWI,W1HDX,ZL1AOX,KA9Q, ZS1FE) will be trying them through the summer, both using Phase-3B and using the ionosphere.

73, Tom

Hank....
Rob Taylor Just dumped all his Packet equipment on me
until he can set a more suitable antenna or somethins. I have
everythins I need, but he still has the old protocol. I need
the new protocol + my call burnt into PROM before I
can operate (also 1200 baud to terminal from VADCG board).
Do you do this ? Does it cost anythins if I sive you the PROMS?
Rob sussested that because of how busy you are, you would prefer
to burn the PROMs at your convienience and just trade for mine.
If so would you prefer already erased PROMs? I could have them
erased without much trouble.
Please let me know what to do as soon as you have the opportunity.
via coputer or land-line 854-3385
Thanks
Andy N6ESS

Posted: Sat May 28, 1983 8:49 PM PDT Mss: JGEK-1573-8649
From: TCLARK
To: amsat
Subj: US to ZL via Packet Radio
28 MAY 83

INTERCONTINENTAL PACKET RADIO TESTS SUCCESSFUL

At approximately 23:00 UTC on 27 May, a successful digital packet radio QSO was held between Tom Clark, W3IWI in Maryland and Ian Ashley, ZL1AOX near Auckland, New Zealand on 28 MHz. This 13850 km path represents the longest distance yet bridged using packet radio. Both stations were using the Terminal Node Controller (TNC) developed by the Tucson Amateur Packet Radio group in conjunction with home built S-100 computers. The QSO used Frequency Shift Keying (FSK) techniques at a data rate of 1200 baud.

Although propagation conditions were marginal, data exchanges consisted of "beacon" transmissions and two-way connection acknowledgements using the amateur AX.25 HDLC protocol; with this protocol messages are sent repeatedly until they are successfully acknowledged by the other station.

Also participating in the test was Bob Diersing, N5AHD in Corpus Christi, Texas; W3IWI and N5AHD have held several successful packet radio QSO's. N5AHD monitored the beacon and text transmissions from both W3IWI and ZL1AOX.

All three stations involved are affiliated with AMSAT and have been experimenting with high speed digital transmissions in anticipation of conducting similar activities with AMSAT's Phase-3B satellite due to be launched in the near future, and with AMSAT's PACSAT packet radio satellite now being designed.

Hank, Harold, Tom, Phil,

I am sending this to you four because you seem to be the most vocal about the terminal support discussed below.

When I began this project I was under the impression that the standard line termination sequence in the computer industry was either <cr> or <crlf>. This appears to be a misconception based on experience with large computers, and in fact line termination appears to be one of the followins (or maybe there are more...): <cr> <crlf> <lf> <lfcr>. Just to make thinss interestins, I found (from Harold and Dave) that nulls were required. The initial requirement seemed to be <cr> -> <cr> <nulls>. It now appears that another requirement may be that <lf> -> <lf> <nulls>. I am not yet clear as to whether this is to altosether replace the first requirement or to be added to it as a separate option.

It is pretty clear that the CR command should be replaced by a "send the SENDPAC character" commmand. This will allow Hank to use <lf> to force a packet and have the line-feed so in the packet. It will also let Phil chanse the force-packet character to, say, an escape, and have it be included. Phil also wants to be able to specify any of 10 or 20 characters to force a packet, which I think is beyond the current board. However, the same effect misht be achieved by chansins the PACTIME parameter to have a ranse of 1/4 second to 4 seconds, instead of 1 to 15 seconds.

Dous Lockhart thinks that if the TNC is insertins linefeeds after carriase return (or maybe carriase return after linefeeds as well...) that the insertion should be done to the stuff soins in the packet as well. I disagree, since if the suy on the other end needs the stuff inserted, he will do it himself or clobber lines in command mode.

I would like input from all of you as to just how fancy the terminal support of this TNC should be. My initial reaction is to dis in my heels and refuse to do any of it, on the assumption that this is supposed to be a packet radio board, not a complete operatins system, and that if people want all this extra stuff they should put it in the computer terminal prosram where it belonss. However, I am willins to consider any reasonable sussestions for the next software release.

Hope to hear from you soon,
Margaret KV7D

Posted: Tue May 24, 1983 2:04 PM PDT Urgent Msg: LGEK-1571-9465
From: VRIP
To: amsat
Subj: New P3B Launch Date
According to W3GEY, ESA has driven a stake in the ground for a L6 launch:
16 Jun 83 rpt 16 Jun 83. All support personnel will depart for FY7
Wednesday, 25 may 83. Next key milestone is flight readiness review 31 May 83.
Pls QRX for additional details. That is all! 73 de Rip

Posted: Tue May 24, 1983 8:27 PM PDT Msg: SGEK-1572-1668
From: TCLARK
To: amsat
Subj: Schedules (both P3B and W3IWI)
On the Phase-3B launch schedule: Jan and Dick are to board a plane Wed AM for FY7. Karl is already en route. ZS1FE will arrive Monday. The word received from ESA today indicates that they will try to shoot for the June 16 launch date, but that the ESA readiness review on May 31 (while all our people are in FY7) will be definitive in setting the date. It is my understanding that ESA will have to avoid a window from 2 days before STS-7 launch until 2 days after landing.

On a personal note, I'll have to be in W6 land all of June -- I am responsible for setting a new VLBI station (40' dish) at Goldstone on the air for measurements beginning 20 June. However, the site is equipped with a KWM-380 + KLM 7-30 MHz Log Periodic atop a 70' tower, so I will not be silent! Will also have TeleMail access. In fact, if the launch is during the time I am there, I might even be able to serve some ALINS role.

Tom

To: Harold Price
Fm: Hank Masnuski
Sj: CR and LF and TAPR

For the next TAPR release, I would like you to consider the followins:

1. Some terminals and systems (in particular, my DG) use LF (newline) as the natural terminator for an input line. If I send a packet usins LF as the end of packet, it (LF) does not set throush. I need an 'LF' command similar to the 'CR' command. More senerally, and 'XX' command which will add any siven character as a terminator.

2. When I am runnins in the above mode, or connected to a system which senerates CR and LF's, I set tons of double spaces unless I turn AUTOLF off. If I turn AUTOLF off, in command mode I overprint with CR or don't end the command (as my natural inclination is to end each line with a NL). Maybe you can terminate commands either with CR or LF or specify the command terminator. My NL senerates an automatic CR.

3. The LF command would also help in talkins to VADCG's, which are setup to end on LF's. A LF also appears to enact flow control, stoppins output.

So maybe you can consider all the various cases and come up with a few more options. Thanks.

Hank

From fortune!hpda!hplabs!hao!seismo!harpo!floyd!vax135!ariel!houti!hospc!houxa!h
Subject: Data Communications using the new Personal Radio Communications Service
Newsgroups: net.ham-radio
Here is a note of interest for packet radio people who want to
use the proposed 900 MHz Personal Radio Service for data communications:

Before the FCC

In the Matter of)
) General Docket No. 83-26
Creation of an Additional) RM-4121
Private Radio Service.)

NOTICE OF PROPOSED RULE MAKING

....

3. Permissible communications.

60. We propse that the new PRCS employ frequency modulation techniques and, accordingly, F9Y emissions are specified in the proposed technical rules for the control channel communications, while F3 emissions are specified for the actual communications exchange. However, by specifying F3 emissions we do not intend to limit communications to voice alone. We propose to allow a communications exchange to consist of any modulating signal which can be accommodated by the voice-grade circuit provided by a PRCS radio. In other words, teleprinting, slow-scan television or any other modulating signal which produces the bandwidth characteristics of a voice emission would be permitted in the new service. While we are not proposing that PRCS units or repeaters be allowed any modulation or RF bandwidth other than that equivalent to a voice-grade circuit, we request comment on the effect adopting emmission standards only for repeater would have on the proposed service [sic].

Well there it is. If you have comments regarding this, or other FCC proposals, you can file comments with the Commission by writing them at:

Secretary,
Federal Communications Commission
Washington, DC 20554

Make sure the General Docket Number appears on the first page of you comments.

Paul Newland, ad7i
..!house!houxe!ad7i

To: All Pacific Packet Radio Society Members
From: Hank Masnuski
Date: May 18, 1983

Subject: PPRS May Meetins

The next meetins of the Pacific Packet Radio Society will be held

Tuesday, May 24th, 8:00 pm, AMPEX Cafeteria

The subject of this meetins will be a discussion of "Future uses of packet radio networks" and the applications which misht be supported. Dave has offered to orsanize some thoushts on the subject and to present a panel discussion.

In other news:

Release 5.1 of TIPM/LIPM is out in the field and most of our users have switched to the new protocol. People who don't have current proms see me at the meetins, or send me a messase prior to it.

Both repeaters have switched to the new protocol, and channel activity seems to be quite heavy in the evenins.

The ARRL has just ordered an additional 200 copies of the 2nd Conference Proceedinss. The first 300 copies apparently sold out.

See you at the meetins --- 73 , Hank

SENT: 19 MAY 83 20:44:55
READ: 19 MAY 83 23:28:40

To : All Packeteers
From : Paul Rinaldo, W4RI; ARRL Hq

1. Well, I'm here and have had two weeks to adjust to things here. Also, as you can see, the computer is operational and on line.

2. George Woodward, W1RN has left employment at ARRL Hq but is working evenings to complete the editing of the 1984 Radio Amateur's Handbook. As it shook out, I ended up as editor for Chapter 14, Specialized Communications Systems, which includes satellites, earth-moon-earth, 10-GHz Gunnplexer communications, amateur television, spread spectrum, radioteletype, and packet radio. Due to deletions here and there in the Handbook, this chapter can be expanded perhaps as much as 6 pages. Plans are to add a description on AMTOR and to expand the packet portion. My rewrite of Chapter 14 will begin circa May 24 and must be finished in early June. This has a short time fuse, so I would appreciate any ideas or suggested material you have no later than June 1. You can send any textual material via this medium. Otherwise, please telephone me at work.

3. Also, this may not interest you personally because they are entry-level positions, but please pass this info to anyone who you think might be interested:

FOR IMMEDIATE RELEASE May 18, 1983

There are two full-time immediate openings in the Technical Department at ARRL Hq. Applicants must have experience as a radio amateur, hold a current Amateur Radio license, possess a solid technical background and have writing and editing skills. Recent design experience is desired in one of the following areas: (1) rf/analog circuitry, (2) digital circuitry, and (3) software development, including assembly and machine levels. These are entry-level positions with opportunity for advancement. Salary is dependent upon academic background and experience. Contact Paul Rinaldo, W4RI, Manager, Technical Dept., ARRL Hq., 225 Main Street, Newington, CT 06111, telephone 203-666-1541.

73, Paul, W4RI

Received: from SRI-UNIX.ARPA by PARC-MAXC.ARPA; 14 MAY 83 23:22:44 PDT
Redistributed: HamRadio↑.ES
Received: from Usenet.uucp by SRI-Unix.uucp with rs232; 14 May 83 23:11-PDT
Date: 13 May 83 13:50:06 PDT (Fri)
To: ham-radio@Sri-Unix.ARPA
From: hplabs!hpda!fortune!dsd!dna@Ucb-Vax.ARPA
Subject: Revision 5.1 of LIPM/TIPM
Article-I.D.: dsd.170

To: All Packet Stations
From: Hank Magnuski
Date: 10 May 1983

Subject: Revision 5.1 of LIPM/TIPM

I have completed work on the first release of the LIPM/TIPM software which supports the new amateur link level protocol on standard VADCG TNCs. This release is numbered Revision 5.1 and incorporates these changes:

1. Support for amateur callsign addressing and all packet types defined in the new protocol, including UI, DM, REJ and FRMR packets.

2. Major cleanup and fixes to the earlier Beta release of this software.

3. Operational tests and compatibility with Revision 2.1 of the TAPR software and Revision 2.00 of the AMRAD VADCG repeater program.

4. Requires a standard VADCG board with only four 2708 eproms.

To obtain the sources on an 8" CP/M SSSD diskette (the only format available), please send $25 to:

Pacific Packet Radio Society
c/o Hank Magnuski
311 Stanford Avenue
Menlo Park, CA 94025

Make the check payable to the Pacific Packet Radio Society or P.P.R.S.
Allow 4-6 weeks for delivery.

Hank,

OK on the transfer of ast.83.05.10.0.ka6m. I mentioned in a ast a month or two ago that messages can automatically be transfered to USENET by creating a filename consisting of the usenet newsgroup followed by _FM_(your call). For example, the following would have worked for your message:

USENET.HAM_FM_KA6M.83.05.10.0

Each morning (as part of the 3AM transfer) I check for any messages to usenet with a _FM_ in it.

(type USENET+_FM_+)

So far, however, no one has used it. I am open to suggestions as to any other convention for a filename to USENET.

In any case, I have transfered your ast to USENET.

== David - W6RAW ==

date: 12 May 83 23:02
From: Alan Larson <WA6AZP>
Subject: EME attempt.
To: Hank

Well, I gave another call to Bob Leonard, who seemed to be the one in charge of such things as use of the dish. Unfortunately, he did not call back. I did find out from others that the dish has been used recently for that new comet (apparently it makes R.F. noise or sounds...), but few held much hope of getting to use the dish for EME this weekend.

BOO HISS!

Alan

Posted: Tue May 10, 1983 10:52 PM PDT Mss: PGEJ-1565-8453
From: IASHLEY
To: tclark
CC: amsat
Subj: TAPR TNC's work in ZL.

Dear Tom,

ZL1AOX and myself were attempting to transmit a file between us using the transparent mode. I was running the link with the TNC at 4800 baud, and was using several nulls after the LF.

However, in the transparent mode I found that these nulls were not inserted and the transferred file had several errors mostly resulting from lost characters after a LineFeed. After discovering this, the fix was simple - operate at 600 Baud where I dont need any nulls inserted.

Although the transparent mode is meant to be completely transparent, I suggest that an option be included to allow the TNC to insert the normal nulls that it inserts while using the cmd and conversational modes.

Despite the above minor problem, the TAPR board works VERY well and was VERY easy to get running. Well done.

Vy 73, Darryl ZL1UFK.

Hi Tom, I confirm Darryl's comments re the TAPR bd, as it goes very well. I have sent Power to Darryl in Hex frmat and it worked first time. I have also hooked up the TS930 by feeding the TNC AF into the 'Patch In' so I'm looking for someone to work on HF. Cud we get a copy of UNLOAD.COM pse; via K1HTV disc wud be sud.

Vy 73, Ian.

Hi Hank -- had a thoroughly enjoyable time doing a TYPE USENET+ ... I'm going to have to get some of that on hard copy for later perusal, too.

We've been working under Unix now and C for a few months, and I've gotten so far away from the dg cli and into the unix shell that I've lost touch with how to send mail to the distribution list. WordStar is being rewritten in C. Don't tell anybody. (Ha!) Everybody knew that didn't they?

Anyway, there are several projects I'm involved in otherwise locally -- I have a bbs running now on my TRS-80, the number is (415) 488-9145, 300/1200 baud.

I'd love to hear and talk to Stu and Dave about the possibility of some packet hardware on Mt. Tam. That's about the only radio location that's viable from here. My boss, N6GE, likes the idea also, and could probably be coerced into providing some assistance.

I'm living in a little rural community in Marin, now, the town of Forest Knolls. It's a lovely place to live, and nice to be away from the bus noise and roommates, but I'm finally beginning to miss packets again. I created an entire project at MicroPro so I could have a decent editor to work on my packet software. Now I have WordStar and WordMaster running on my trs-80 doses, and I'm ready to start hacking again. What's more I have access to some nice development environments for doing expanded work. I'm itching to play again.

I would appreciate your distributing my little letter here to the distribution, Hank, and since I found the numbers again, I should be on quite regularly from work. (I can do a modem-relay through our development system to avoid the toll charges). Don't add me to the distribution until that becomes a reality though...

Hi to all -- looking forward to seeing you again.

Mojo, aa4kb/6 (north division)

To: All Packet Stations
From: Hank Magnuski
Date: 10 May 1983

Subject: Revision 5.1 of LIPM/TIPM

I have completed work on the first release of the LIPM/TIPM software which supports the new amateur link level protocol on standard VADCG TNCs. This release is numbered Revision 5.1 and incorporates these changes:

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Pacific Packet Radio Society
c/o Hank Magnuski
311 Stanford Avenue
Menlo Park, CA 94025

Make the check payable to the Pacific Packet Radio Society or P.P.R.S. Allow 4-6 weeks for delivery.

TO: HM
FROM: LJ
SENT: 29 APR 83 02:57:30
READ: 30 APR 83 18:01:25

Questions Regarding Amateur Radio Regulations as they pertain to Packet Radio

A problem has developed for packet radio station operators and designers. The problem is that packet radio communication is somewhat unique in its characteristics and capabilities. Attempting to apply existing FCC regulations and rulings has led to conflicting interpretations.

In an attempt to resolve this problem, several individuals and groups have made inquiry on specific points to various FCC field offices. The responses to these inquires has not been totally consistent. Also,several points remain to be addressed. Since the capabilities of packet radio are now becoming clear, this is a good time for the FCC central office to make clarification statements concerning some specific aspects of packet radio.

TRANSMISSION IDENTIFICATION

The fact that all amateur radio stations must identify themselves is clear and unambiguous. Who could argue with this? The result is beneficial to everyone involved. Just how this must be done and at what intervals is not as clear for packet radio.

There are two major reasons why the FCC must be able to identify the source of an RF signal. First, if there is a problem with the QUALITY of that signal, the source must be identifiable so that notification can be made to the station operator. Second, if there is a problem with the CONTENT ofthat signal, there is again a requirement to be able to identify the operator.

FCC monitoring stations have no difficulty when the transmissions involve voice (English language) or CW (morse code) messages. As a result, all stations must use one of these modes to identify themselves even if the message content is sent in some other code (Bodot, ASCII, Slow Scan Television, Fast Scan Television, etc.).

Using voice or CW to identify with will only allow FCC monitors to detect problems with signal QUALITY. When the message is in some other code, special equipment is needed to decode the CONTENT of the message.

PACKET RADIO COMPARISONS

Packet radio stations can have the capability to do what is popularly refered to as "digipeating". Just what "digipeating" is makes a big difference when interpreting the FCC regulations governing the operation of an amateur radio station with this

capability.

A repeater, as traditionally implemented by FM users, receives messages on one frequency and simultaneously retransmits the message exactly (as close as the device is technically capable of doing) as it was received on another frequency. This simultaneous use of two frequencies has led to the establishment of repeatersub-bands within some of the amateur frequency allocations. This type of station must identify itself at least every 5 minutes in voice or CW sent no faster than 20 words per minute. The orisinator of the message is identified in the retransmitted message. Theserepeater stations are allowed to operate automatically (if they have provision to automatically shut down if the transmitter is on more than a specified lensth of time).

Another popular amateur radio activity is "traffic handlins". In this activity, a station acts as a relay station. The message is received by the relay station on one frequency. It may then be retransmitted on that same frequency or any other frequency allocated to Amateur Radio use. The retransmission is always separated in time from the reception of the message. This seperation can be anywhere from a few seconds to a few days. The content of the message is often modified slishtly in that the identity of the orisination station is often dropped. This type of station must identify itself at least every 10 minutes usins either voice or CW sent at what ever speed the operator is capable of.

When this relay activity is performed usins RTTY as the message encodins technique, the message is often stored at the relay station on punched paper tape. This makes it possible for the operator to re-send the message much easier and with sreater accuracy. With the availability of the microprocessor, the use of paper tape is sivins way to masnetic tape, masnetic disk, and solid state microprocessor memory.

Packet radio "disipeatins" is much more like a relay station than like a repeater, although there are similarities to both.

With packet radio "disipeatins", a message is received and stored in solid state microprocessor memory. The message is then retransmitted at a later time (usually a few seconds) on the same frequency. The message is modified slishtly. All of these thinss are more like a relay station than a repeater.

The one similarity packet radio "disipeatins" has with a repeater is that it can be run without an operator (automatic) and has provision to shut down the transmitterif it is on an excesive amount of time (usually set at less than 15 seconds).

The question then remains, what resulations sovern the operation of a packet radio station capable of beins used as a "disipeater". It seems reasonable that a combination of resulations pertainins to repeater stations and relay stations misht be appropriate. From a practical standpoint, however, this is only workable if the FCC explicitly states which resulations apply.

QUESTIONS AND RECOMENDATIONS

The questions which have been raised are as follows (there may be others):

1)
Must a packet radio station capable of operating as a "digipeater" operate in a repeater sub-band?

To require this would seem particularly wastful of spectrum since a"digipeater" only uses one frequency. Repeater sub-bands are typically organized into frequency pairs. The second frequency of the pair would so unused (unless a second local area packet radio network were established on it).

There is also the questionable practice of an established "input" frequency being used for output and/or an "output" frequency being used for input to be considered (packet radio "digipeator" stations do both output and input on the same frequency).

Additionally, for most packet radio stations, being available as a "digipeater" is a secondary function being performed as a courtisy to other stations in the area. The primary function of most packet radio stations is to communicate from that station to some other station. This is usually done directly (simplex) or may be done throush some other "digipeater". (There is no limitation which must be placed on the number of "digipeaters" operating in a local area on the same frequency. Each packet sent throush a "digipeater" can specify which "digipeater" should relay it, the other "digipeaters" can ignore it. It is anticipated that most stations would be capable of operating as a "digipeater" all the time they are powered on. All this activity can take place on one frequency. Some protocols may restrict some of this and the operator has the option of whether to allow his station to be used as a "digipeater".)

It would seem reasonable that any communication technique which only uses one frequency (including packet radio stations capable of being used as a "digipeater") should be able to operate outside of established repeater sub-bands.

2)
How often must a packet radio station which is capable of being operated as a "digipeater" identify itself?

The answer to this question could depend, to some extent, on the answer to the previous question. If it is determined that a packet radio station capable of being used as a "digipeater" is to be resulated as a relay station, then the answer is easy; every ten minutes.

If the answer to question 1 above is that a packet radio station capable of being used as a "digipeater" is in fact a repeater, then the answer to this question could be more complex. It would still be possible, however, for the FCC to specify a ten minute maximum interval for ID.

A dual answer is possible. It could be specified that a packet radio station originating its own messages must identify every 10 minutes and if a packet is relayed from some other station, that identification must take place within 5 minutes of transmitting that relayed message.

This all seems overly complex. It would seem reasonable that all packet radio stations be required to identify every ten minutes regardless of their classification.

It should be noted that for most packet radio users, it is particularly irksome to have to identify in a code (voice or CW) which is different that the code being used to transmit messages. This is particularly true due to the slow speed (20 words per minute) required. It is a mathamatical coincidence that the baud rate for currently used modulation techniques is approximately the same as "words per minute".

Packet radio desisners think of 1200 baud as very slow. The FCC has attempted to encourage the development of much higher data rates by specifying maximum permissable bandwidths on some bands which would allow for baud rates in the millions! To be sending messages at these rates and to have to stop and identify at 20 words per minute is difficult to understand. At the very least, it is wastful of the resources involved (time and frequency). It could also be an inhibitor of innovation.

If the FCC wants to encourage the development of digital communication, it could specify that identification be done in some digital code (ASCII?) and that it be sent at a speed consistent with the speed of the message data being sent and using the same modulation technique.

3)
What is the difference between a repeater and a beacon?

When a repeater identifies itself at least every five minutes without any other activity, how is this different from a beacon?

If the repeater also sends some self-generated message (such as its location), does this have any effect on the answer to this series of questions (question 3)?

What category would a packet radio station be in if it were to identify itself and send a self-generated packet message after the frequency it is on has been quiet for some period of time?

Unattended beacon stations are now authorized on specified sub-bands within bands authorized for amateur radio use. Beacons are primarilly useful for determining propagation conditions and are most useful when they are alone on a frequency.

A packet radio "beacon" would not be a continuous beacon and so it does not seem reasonable that it should have to ID at least once per minute. To ID once each transmission would seem adequate.

A packet radio "beacon" would most likely be on the same frequency as a local area network (including "digipeaters"). It

can also be set up to only act as a "beacon" when there has been no other activity on the frequency for a specified period of time. Because of this, it does not seem reasonable to restrict unattended packet radio stations also acting as "beacons" to "beacon sub-bands".

Chuck Green - N0ADI

Please send comments to:

Tucson Amateur Packet Radio
P.O. Box 22888
Tucson, Arizona 85734

To: Hank
From: Bill
Subject: Freebies

Hank,

Yes, I have access to those. I will bring a directory listing to the meeting so you can peruse it and see what you might be interested in. If you want anything, Cindy can bring a disk to work some day and I can copy stuff to it. (This assumes you can use SS-SD 8 inch CPM disks). We have the modem program already at Xerox (in fact I am using a slightly older version of it now, so if you have Cindy bring in a disk next week I can copy that for you.

I will be bringing some documentation and my modified packet board to the next meeting so that people interested in doing the downloading modification can find out about it. See you thursday,

Bill

To : All Packeteers
From: Paul Rinaldo, W4RI
Subj: Changes at AMRAD

Last night (April 24) the AMRAD Board of Directors elected a new slate of officers:

President	:	Terry Fox, WB4JFI
Vice-President	:	Bob Bruninga, WB4APR
Secretary	:	Bill Pala, WB4NFB
Corresponding Secretary	:	Howard Cunningham, WD5DBC
Treasurer	:	Gerald Adkins, N4GA

Special-Interest-Group leaders:

Packet Radio	:	Dave Borden, K8MMO
Handicapped Communications	:	Dick Barth, W3HWN
RTTY (Incl. DEAFLINK)	:	Bob Bruninga, WB4APR
Spread Spectrum	:	Hal Feinstein, WB3KDU

(DEAFLINK is a concept to permit deaf TTY patching over hf ham radio similar to phone patching for hearing people. At each end of the hf link, the hams make landline contact with their party using deaf TTY - 45-baud Baudot using 1400/1800-Hz tones. The hams do a digital patch to their standard 170-Hz hf RTTY modems. We have a number of people across the country interested in doing this. Bob agreed to take on the job of organizing it. In case any of you are interested, or know someone who might be, please contact Bob via PRNET.TF. Bob just arrived from sea duty in Japan and is in transit to his new job assignment in EE Dept. of the Naval Academy and does not yet have mailing addresses and phone numbers nailed down.)

There was no change in the line-up of Directors (requiring election by the AMRAD membership) who are:

Jeff Brennan, WB4WLW
Terry Fox, WB4JFI
Bill Pala, WB4NFB
Paul Rinaldo, W4RI
Elton (Sandy) Sanders, WB5MMB

Also, AMRAD has a new mailing address:

P.O. Drawer 6148
McLean, VA 22106

Electronic mail for AMRAD should go to PRNET.TF.

I plan to continue to be active in AMRAD as is possible in my new position as Manager of the Technical Department at ARRL Hq and Senior Technical Editor for QST. In that job, I'll be working with most of you on development of amateur packet radio and inviting you to write material on digital communications subjects for publication in QST, QEX and ARRL technical books. You can continue to address electronic mail to me as PRNET.PLR which can also be used for anything going to other people at ARRL Hq. My office phone is 203-666-1541. The office mailing address is American Radio Relay League, Newington, CT 06111. My home address is 115 Starr Ave, Newington, CT 06111. I don't have home telephone number(s) yet.

With this, I'm pulling the plug on this computer which will be incommunicado until the week of May 9th. Hope to see many of you at the Dayton Hamvention where AMRAD, TAPR and SLAPR will share a table to promote packet radio.

73, Paul, W4RI

Posted: Sat Apr 23, 1983 9:57 AM PST Urgent Mss: LGEI-1556-6795
From: VRIP
To: AMSAT
SubJ: Phase IIIB Launch Delays
Report from Kourou 17:30 UTC 23 Apr 83
(De Gordon and Jan via FY0ESE, 21.360 MHz, to WA2LQQ)

1. Preparations of the s/c are going well.
2. A slip in the launch appears inevitable. The magnitude of the slip is indeterminate at this moment. Could be 1 week to 5 weeks or more pushing launch date into August.
3. There are two significant problems:
   a. Turbo pumps [no elaboration given on the air]
   b. Inertial nav system [likewise no elaboration]
4. Our crew will complete all preparations up to s/c fueling. They will then return home for an indeterminate period. About one week's work will be needed upon return to Kourou.
5. A major review/meeting will be held tomorrow, Sunday.
6. The next major decision point is 16 May 83 [launch day set then?]
7. Jan would like to QSO with both KA9Q and W0PN on Sunday, 24 Apr. Suggest they tune 21.360 o/a 1700 UTC.
8. Jan will call [LL] WA2LQQ on Monday.

This info is suitable for public dissemination for release now.

Posted: Sat Apr 23, 1983 6:27 PM PST Mss: MGEI-1556-7212
From: VRIP
To: PR
SubJ: ASR Item On P3B Delay

[Following from upcoming ASR]

Delay Forces Phase IIIB Launch Crew Home

Faced with an uncertain delay of from 1 to 6 weeks in the Phase IIIB launch, the AMSAT team at Kourou will be returning home after bringing thespacecraft (s/c) up to a high state of readiness. The exact cause of the delay was not known at press time although two areas of prior concern cenetered on the turbo pumps and the inertial navigation system.

According to W3GEY, speaking from the launch site at Kourou, "the problems are multi-dimensional and not insignificant." The result, says W3GEY, is that "a slip in schedule is virtually inevitable although the magnitude of the slip is indeterminate at this moment. We Should know more tomorrow [Sunday, 24 Apr] and may have some more news to report then."

Launch had been scheduled for 3 June at about 12:00 UTC. The European Communications Satellite (ECS-1) is co-prime on this mission.

The AMSAT launch integration team consists of workers from AMSAT, AMSAT DL and AMSAT SA (South Africa). Their function is to check out all the s/c systems, integrate the s/c with the launcher and fuel the kick motor tanks with Nitrogen Tetroxide and UDMH (Unsymetrical DiMethyl Hydrazine). According to W3GEY, "We will do every thing we can to bring the spacecraft up to its highest state of readiness but will leave the fueling undone. We will then return home and wait for the new launch date to be firmed. Then, when we all is ready, we will return to Kourou to complete the effort; about a week's work for the team." It is understood the ECS-1 team will follow

a similar routine.

Team members began arriving at Kourou around 15 April. Jan King, W3GEY, had flown to the Marburg Headquarters of AMSAT DL a week earlier than that. The s/c has been ready at Marburg for several months. After final preparations for shipping were made, Phase IIIB was shipped to Kourou about 12 April. Dick Daniels, W4PUJ, had flown to Kourou via Puerto Rico 15 April. Gordon Hardman, ZS1FE/KE3D flew to Kourou from South Africa 17 April. The AMSAT DL crew under President Dr. Karl Meinzer, DJ4ZC flew in two groups including W3GEY, on 18 and 20 April. Radio contact with the outside world comes via special stations FY0ESE, FY0ESZ, FY0HIG as well as the European Space Agency station FY7KRU.

Amateur Satellite Report and the AMSAT affiliated nets will carry latest information on the launch schedule as it becomes available. Revised ALINS (AMSAT Launch Information Network Service) will be issued by Project Manager and Assistant Vice President Ralph Wallio, W0RPK, as soon as a new launch schedule is announced.

TO: HM
FROM: TC
SENT: 24 APR 83 04:45:52
READ: 24 APR 83 15:55:55

Margaret, Harold, Hank, Lyle, Pete:

Just a quick note to tell you that K1HTV/KA1GD and I did a PR demo today (4/23) a computer faire sponsored by Goddard Computer Club. KA1GD computer running in North-Star BASIC had a number of games and a broadcast bulletin that ran with few hitches for abt 8 hours steady.

By the way, K1HTV/KA1GD worked WA2LQQ (NY) on 2m tropo packets using both AFSK-FM & FSK(via SSB radio). contact was a bit marginal, but they did make it. They are now tied with W3IWI in the PR WAS sweepstakes at 3 (both of us have MD/VA, I have TX) -- anybody else planning to try some long-haul tests?

I am still hoping to wrk myself off the moon on 70cm during the WVa EME outing on the weekend of 15 May. Hank--any chance you can crank up WA6LET?

Tom

To: Paul Rinaldo
From: Hank Magnuski
Date: 21 April 1983

Subject: Level 1 Specification - Interface between the modem and radio

Thanks for sending me the Level 1 document. It obviously has had a lot of effort put into it. You asked me for some comments, and I would like to give you some ideas concerning standards for the radio/modem interface.

These thoughts are the result of having to interface three TNC's and a repeater to five different 2-meter radios. Other people will have their own preferences, and I do not mean these comments to be the final word.

1. The standard plug -- I decided very early that I would like to switch any radio to any TNC or the digipeater without having to rewire anything. So I adopted a Molex 9-pin miniature plug as my uniform connecter (part numbers 1625-9P and 1625-9R). It is cheap and easy to work with.

2. Interface circuits

Microphone circuit -- Two pins are dedicated to audio to the transmitter, using a miniature coax cable. Driving this cable is a circuit which consists of a series resistor and trimpot, which presents 600 ohms to the modem and allows adjustment of output voltage level. A 1 ufd. cap decouples the audio to the transmitter. There should be enough jumpers and options on the modem to handle all reasonable radios. A very useful option is to have switches on the modem to allow either tone to be continuously presented to the transmitter for level checking, tuneup, etc.

Audio out -- The modem will present a 600 ohm load to the speaker. Enough jumpers and options should be available to properly terminate any radio. A shielded cable is not required, as this is a low impedance circuit.

Audio return -- This lead can be used to feed the audio signal back to the speaker of the radio, via a switch control. One can then monitor activity on the channel. One would also like to easily monitor modem audio output, perhaps through use of a separate audio amp.

Push-to-talk -- A relay or open collector transistor to ground. Manual override switches for testing and tuneup are useful.

Squelch indicator -- Gives an indication of whether the squelch is open or closed. I don't like my digipeater to beacon over a voice QSO on frequency, and wait for 30 seconds of clear channel. Should present a moderately high impedance load to the radio, and jumpers should allow inversion of the polarity of the signal.

Power -- One usually wants one of these two power options available:

a. Battery trickle charge - a DC voltage which can be used to keep the NICADS fresh.

b. Transceive Power -- a DC voltage which can fully power the radio running at 90% duty cycle.

Note that radios differ in their voltage requirements. My radios use 10 volts to 13.8 volts for proper operation.

Ground -- DC ground for the control circuits

3. A uniform color encoding of the signal wires helps avoid confusion and mistakes.

I have not covered more advanced features such as frequency control, antenna switching, etc. The circuits listed above have served my immediate needs well.

TO: HM
FROM: TC
SENT: 23 APR 83 03:11:55
READ: 23 APR 83 05:51:41

Paul,Hank,

Re level 1 spec, I concur in HM's comments EXCEPT that I have chosen ordinary cheap RCA phono pluss for the tx audio, ptt, rx audio and squelch signals.

Level 1 spec should also state that for 1200 baud use, the xmtr MUST have a timer to kill any "forever packet" xmissions > 15 seconds.

The WD6BPR/R packet repeater will be operating high level this weekend from 12:00 Saturday 23-Apr-83 to 12:00 Monday 25-Apr-83 from a site east of Chico at about 2000 ft. If you can hear this repeater, please connect with station WB6KTN. That station will be a remote CPM computer that will accept your comments. Thank you very much.

Mike (WB6KTN)

P.S. We are still operating on 146.58 MHZ. If this repeater interferes wiht any exesting repeater, please say so and we will *NOT* stay on the air from this location.

)
//

From: Dave - KE6ZE
To: HM
Subj: N6FTZ packet workins

Hank,

I have gotten this beast up and working now. I have sucessfully connected to the computer and am leaving this message via packet also. For all that read this message my call is now KE6ZE but the packet board has my old call N6FTZ. If you desire to connect to me via the ether use N6FTZ until we all change to AX25, at which time I'll have my correct call blasted in. Leave mail for me on the DG under KE6ZE though. Please add KE6ZE to the active users list now.

Thanks

Dave - KE6ZE

TO: HM
FROM: JS
SENT: 24 APR 83 00:10:35
READ: 24 APR 83 01:25:55

To Hank Masnuski and Paul Rinaldo,
cc PRNET ACCTUSERS

As you have probably become aware, the VADCG is having difficulty in finding more volunteer effort. The people involved in the past are no longer able to devote as much time to provide the support the VADCG has tried to give to other packet groups and individuals.

Hopefully others will step forward to keep things going, but in the meantime the club still has a significant inventory of parts. These are mainly TNC boards. I would like to get them sent out to people who can use them or see to their distribution to others. If any groups are interested in receiving 20+ TNC boards on consignment or taking on responsibilty for the distribution of all the boards, please reply here. Since they are already paid for, I feel a consignment arrangement would be best so that the accepting group will not have to get the capital together first. We have done this once or twice before and as before should be able to give a volume discount. Most of the boards are being held for us in Bellingham, WA, so there would be no risk of US Customs duties.

Regards,

John Spragg VE7ADE

TO: HM
FROM: TC
SENT: 22 APR 83 05:07:41
READ: 22 APR 83 05:46:18

Margaret,
In general I agree, but those probes that have been made at the FCC indicate that they still consider digipeaters as repeaters. To add fuel to ur fire--a repeater operates in real-time. Digipeaters do not.

Consider a CBBS running on the air on VHF or one of the rtty mso's on HF. A person can deposit a msg, which is retreived at a later time by the recipient. Surely the mso's on 7095 khz are not repeaters. Now, how long is the msg stored by the system becomes a critical parameter. In the case of digipeaters (dumb ones w/o routing), the answer is measured in seconds. but it is still not real-time. I think that we need a concerted effort to get this interpreted by the fcc. Here is another related problem. rptrs on 10m must be 29.5-29.7 MHz. Depending on how you read the digital rules, packets seem to be legal only 28.0-28.5. Ergo, if digipeaters are rptrs, 10m digipeaters are illegal. qed. As you see, the absurdities can become overwhelming (I just love reducto ad absurdo logic arguments!).

Perhaps the way to handle the ID problem is the following. add a new instruction IDCALL. If this is set to NONE, then use MYCALL for the ID, if it is not NONE, then take the value entered as the call text. Only NOVRAM save the "None" vs. non-none bit (or else init to none when turned on) just like is done with the MONTO, MONFROM, etc. That way we could have our cake & eat it too. Since the special call would be in RAM, it's length restrictions would not be so ominous. We can hit legality problems -- consider the fact that MYCALL won't handle WA7GXD/VE3 (or even worse, the one miki pointed out if he were operating a digipeater in west germany DL2/JR1SWB/RPT --- I see that at least 15 characters of space should be allowed for the pathalogical cases. Hence it cannot be NOVRAMmed.

73, Tom

Posted: Sun Apr 17, 1983 1:12 PM PST Mss: YGEH-1552-8904
From: TCLARK
To: amsat
Subj: W5LFL on STS-9

Here follows the "most final" version of the Joint ARRL/AMSAT press release which (supposedly) was announced last night by K6DUE/W4KFC at ARRL Midwest Div. Convention. WORPK -- please give us all a report on the festivities ASAP.

For release April 16, 1983

NASA OKs "HAM IN SPACE" PROPOSAL

SHUTTLE ASTRONAUT OWEN GARRIOTT TO COMMUNICATE WITH RADIO AMATEURS ON EARTH

Victor C. Clark (Amateur call letters W4KFC), President of the American Radio Relay League (ARRL) and Dr. Thomas A. Clark (Amateur call letters W3IWI), President of the Radio Amateur Satellite Corporation (AMSAT) today announced acceptance by the National Aeronautics and Space Administration (NASA) of a proposal submitted by their two organizations to include an amateur radio station aboard an upcoming Shuttle mission. They said that in giving its go-ahead, NASA's Associate Administrator for Manned Space Flight, Gen. James Abrahamson, has designated the STS-9/Spacelab flight, to be flown this fall, as the mission on which the amateur radio equipment will be carried.

The Space Agency's approval is based on a number of conditions which both ARRL and AMSAT find entirely acceptable. Among them are that the use of the amateur radio equipment aboard the Shuttle shall not interfere with its planned mission. Operations will be carried out on a non-interference basis during the Shuttle crew's "free time". It is also understood that special amateur radio transmitter and receiver will be furnished by the amateur radio community at no cost to NASA.

The primary mission of STS-9 is to carry the Joint U.S.-European Spacelab aloft in the Shuttle's cargo bay. This particular mission was selected for the amateur operation because it includes in its crew Dr. Owen Garriott (Amateur call letters W5LFL), who will serve as the operator of the spaceborne ham radio station. Dr. Garriott has been an active radio amateur for many years and is eagerly awaiting the chance to pursue his hobby from space. He commented that amateur radio has been important in developing his own professional skills and those of many others around the world involved in technical professions. He is especially pleased that NASA has given the nod for the operation as he feels that it will be instrumental in bringing the space program home to many people in this country and the rest of the world. He notes that the orbital track to be taken on the STS-9 mission makes it especially suitable for communicating with a large number of amateurs as it extends farther north and south than did earlier Space Shuttle missions.

ARRL President Vic Clark expressed his great pleasure at the NASA decision. He said that the League represents the radio amateurs of this country and, through its affiliation with the International

Amateur Union (IARU), those of many countries throughout the rest of the world. Thus the ARRL is extremely happy to play a key role in this worthwhile endeavor. The Joint ARRL/AMSAT proposal approved this week by NASA calls for the ARRL to furnish the special amateur radio equipment for use on the Shuttle. The ARRL will also organize and coach earthbound amateurs in techniques and procedures for rapid and efficient communication with the orbiting astronaut. This will be done through the pages of the League's monthly magazine QST, which reaches some one hundred and fifty thousand licensed amateurs, and its affiliated clubs throughout the U.S., Canada and the rest of the world.

Dr. Tom Clark (no relation), President of AMSAT, was also enthusiastic about the impending amateur operation from space. He noted that AMSAT is responsible selecting appropriate frequencies and operating modes for the "ham in space" operation and made many of the initial contacts with NASA officials which preceded submission of the proposal. Dr. Clark noted that AMSAT is an international organization devoted to promoting amateur space involvement. Since its birth in 1969, AMSAT has been responsible for the successful orbiting of five "OSCAR" (Orbiting Satellite Carrying Amateur Radio) satellites, all of which were launched as secondary "piggyback" payloads on NASA missions. The newest OSCAR built by AMSAT is designed to provide worldwide communication among radio amateurs, is now poised for launch on a European ARIANE flight in June.

Another key organization involved in putting an amateur station aboard the Shuttle is the Johnson Space Center Amateur Radio Club. This group, known by the amateur radio call letters W5RRR, numbers among its members many experts well versed in testing and preparing equipment for manned space missions. Members of this club are charged with a number of tasks to insure that the ham equipment used on the Shuttle will function properly and will not disrupt other vital spacecraft functions. Included in these tasks are the adaptation of an existing Shuttle antenna design for use on the internationally recognized "Two Meter" amateur radio frequencies.

With the flight of STS-9 this fall, amateur radio will continue its long history of service. Amateur radio will provide the first time in the history of man-in-space when the general public will be able to communicate directly with an astronaut in orbit -- It is expected that tens of thousands of individuals, including elementary and secondary students, citizens of developing countries and the "man on the street" will experience the excitement of hearing the words come from space "CQ from W5LFL aboard the Space Shutttle".

For additional information, contact:

American Radio Relay League (ARRL)
225 Main St.
Newington, CT 06111
(203)666-1541

Radio Amateur Satellite Corp. (AMSAT)
850 Sligo Ave.
Silver Spring, MD 20910
(301)589-6062

- - - -

TO: HM
FROM: DC
SENT: 16 APR 83 06:08:12
READ: 16 APR 83 21:12:32

KD2S relocates back East

Well guys, I've accepted a position with the Wang Corporation in Lowell, Masachusetts, and I'm bidding the Wild West an ADIOS! Leaving behind the Tucson Amateur Packet Radio Corporation (in better hands now than when it started!), I'll be attempting to push New England hams beyond their limits of enduring obnoxious noises on VHF/FM, on the ground and in space.

I'll be a Senior Engineer for Wang's Small Systems Division, Corporate Research and Development. I'll be working on (of all things) telecommunications and networking for certain projects which will become public in the months to come.

Two nice things happen with this move (other than a return to more familiar stomping grounds). First, WANG has shown an interest in helping with the pursuit of the PACSAT project. We can expect technical support in certain areas, and much of my travel may end up being covered as "exploratory endeavors". Further, due to the the nature of my work, I may be spending time in the Washington area with some regularity.

Secondly (and more important), I plan to move into the general area of one W1HDX, who, with WA1DCF, is now in the process of popularizing digital communications and packet radio in the Eastern Massachusetts domain. We're looking at houses in the vicinity of John, and if our plans come through, we should end up on the backs of any of several of John's horses within three weeks.

One serious problem associated with our major move is its timing... I'll be moving the weekend of Dayton! I had planned on giving one of AMSAT's presentations there, but will instead probably end up crawling around my attic in one final sweep to extract whatever aluminum tubing I can find still stashed there. Lyle, Harold, Pete and I will be meeting next Wednesday in San Diego, and the group will bring the Word to Dayton.

I will enjoy the closeness to both Washington and Newington, and will become very active again in PACSAT following a few debilitating weeks of traveling and relocation. Expect me to be off the air for the first week of May, plus or minus a few days.

Thanks & 73,

Dan

TO ALL, IN CASE YOU HAVEN'T SEEN THIS PRODUCT FROM RS THE
FOLLOWING IS FOR YOUR INFO, COMMENTS TO LSK AS U WISH

A new product announcement of interest 19830408 L S KAYSER
Radio Shack TRS80 - Model 100 - Portable Computer

Radio Shack has introduced a portable computer with a feature set
designed to stimulate the telecomputing market. The essential
basic features of the new machine are as follows.

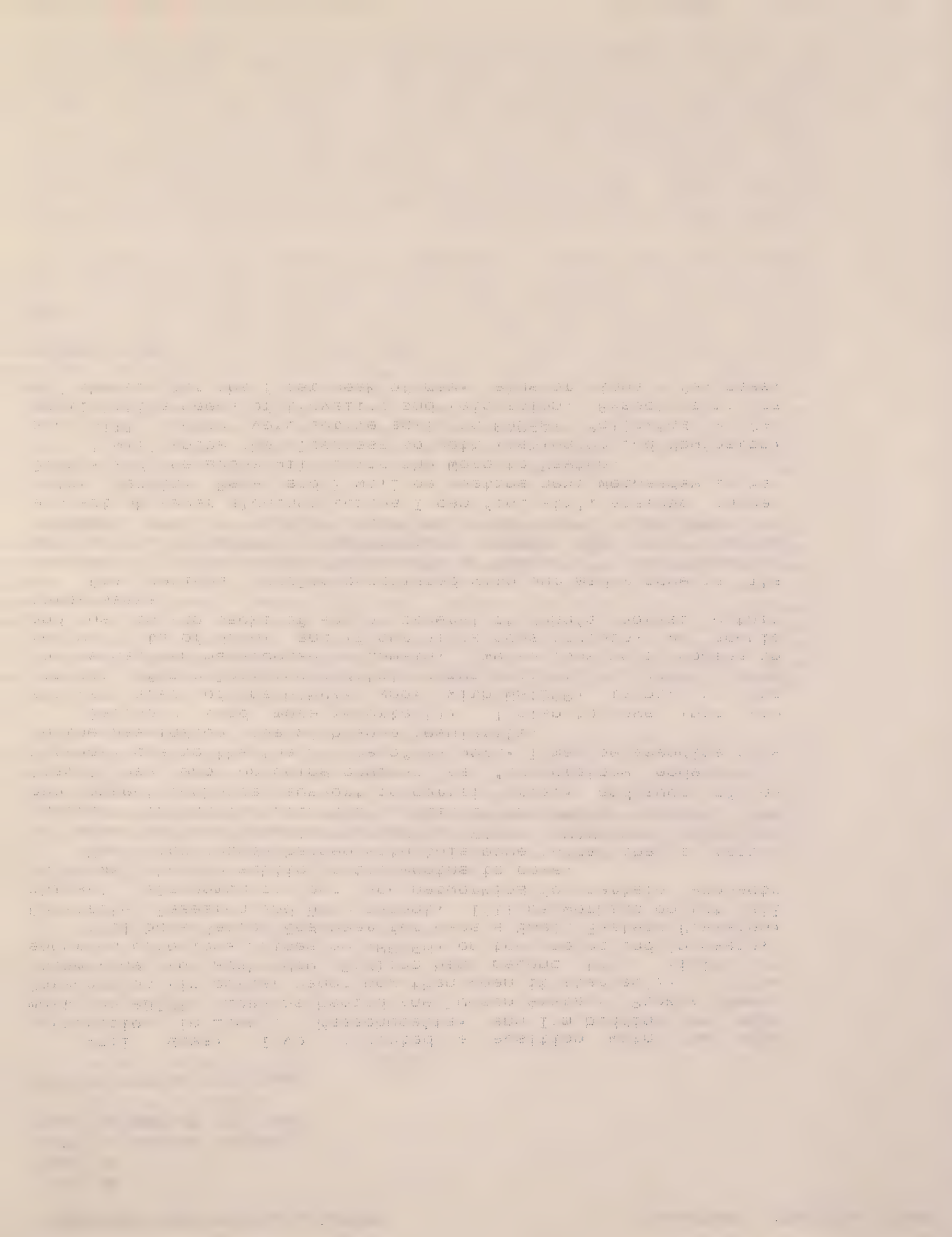
Size 8.25 x 11.6 x 2 inches, weight 3 lbs
Based on the 80C85 micro in CMOS logic operating at 2.4 Mhz clock
and supporting from 8K to 32K bytes of user program space
Powered by internal 'AA' penlight cells (4 of them) or external
calculator type power supply from 115 V AC.
Display Liquid Crystal type (LCD) of 8 lines of 40 characters,
with cursor addressing to the character and pixel level addressing
in the graphics mode.
Keyboard, typewriter style, simple but adequate for telecomputing
RS-232 communications port 75 to 19,200 baud software selectable
The RS-232 control leads RTS,DTR,CTS,DSR are implemented
Parallel printer port , Centronics compatible
1xx Modem fixed at 300 baud with auto orisionate and manual
answer modes (separate from the RS-232 port)
Internal tone generator, multi octave, programable
Internal 40 pin connector to system bus, and additional ROM
socket for additional system program.

Software -
Microsoft extended BASIC interpreter
Telecom - comprehensive TERMINAL package including 'auto log on'
capabilities
Schedule/Address (ie phone numbers)
Clock/calendar - programable

Software integration is extensive between the various applications
and the BASIC. The terminal, audible alarm, schedule, address,
clock, applications can be interworked by programs written in the
BASIC interpreter to support sophisticated personalized and
application specific needs. RAM storage is maintained by battery
backup when the unit is turned off - thus permitting truely portable
operation.

Provisions for external connections
Sockets are provided for the following - power,printer,RS-232,
with switches for computer on/off (on the bottom) and system
on/off on the side. (the first one disconnects the internal battery)
A side mounted rotary display adjustment is provided for adjusting
the LCD for best viewing. The Modem and Cassette interfaces use the
'DIN' type connector. Radio Shack gives RS part numbers for a
range of connectors including accoustic coupler cups and a direct
connection cable for the modem port.

Comments:
Radio Shack has not included any mechanical trivia such as a tiny
printer or a cassette recorder (although connections for same and
software drivers are provided) in this unit. The possibilities for
mechanical failure are radically reduced. A quick review of the
BASIC interpreter and the included applications programs shows an
extensive use of a very sophisticated interrupt system that greatly
enhances the product in the business and telecomputing modes of



operation. This product will provide an excellent capability to those requiring these types of features and represents a major jump forward in the MASS telecommunications/computing market.

A new product announcement of interest 19830408 L S KAYSER
Radio Shack TRS80 - Model 100 - Portable Computer
Part 2 - Observations, Competition,Intelligence, Conclusions

Observations
The provided internal applications program for editing is basic but adequate for general use. The organization of the display and the use of the 80C85 processor does however suggest that very shortly a ROM (to fit the provided socket) will be available to upgrade this editing to a feature set that will be identified as Word Processing.

The choice of BUS signals on the 40 pin connector (specifically S0, S1, CE, INTA, INTR, and RAM RESET) suggests both a disk system (using the 3.x or 5.25 drive systems) and/or a MASS RAM (volatile, non volatile such as Bubble's) storage schemes will be provided in the near future.

Competition
The current EPSON and similar products which often include micro sized printers and cassette drives will experience severe pressure from the TRS80 - Model 100. The 'calculator keyboard' pocket computer market (Radio Shack, SHARP, Hewlett Packard etc) will also experiencesevere market erosion as they are 'function poor' and 'utility poor' in comparison. The Asian competition in this market will become intense in about 18 months.

Intelligence
Radio Shack sales expectations for the balance of '83 and 84,85,86 is based on minimal sales of 500,000 units.

Conclusion
The elegence of eliminating mechanical technology, the software application integration level achieved and the inclusion of a 1xx modem with answer and auto oritinate capability is, in the opinion of the writer, as significant an event for portable computing/ telecommunications as is the introduction of the Apple IISA was for the upscale business community. The writer has never considered Radio Shack computing products previously as they have been behind where the writer's needs were at the time, toys in capability, or vectored to a specific market not in the writers interests. The Model 100 will see extensive use in portable telecomputing applications, as a test set in maintaining other computing systems and as a portable business terminal in management and sales areas. The use of the Model 100 in laboratory and engineering fields should be greater than the calculator was within a few years. Radio Shack has come out with a winner in a new market - we live in interesting times.
A new product announcement of interest 19830408 L S KAYSER
Radio Shack TRS80 - Model 100 - Portable Computer
Part 3 - Internals

Internals
A quick look inside the Model 100 has produced the following.

The unit is opened by removing 4 Phillips screws on the bottom and the unit opens like a book due to the connectors from the keyboard

and display over to the computer board. Care is required in this operation as there is a plastic lip on the front edge which needs adjusting in the opening process.

The back of the LCD display is covered with multi pin IC's and is the most expensive single component in the Model 100, (see more on this later). The keyboard is standard and both of these connect to the main computer board via flat cables. The main computer board is mounted on top of a metal plate which is part of the shielding necessary for control of the radio noise created by the computer.

The modem is an old favorite of the industry a type '1441?' and uses micro sized relays in the telephone interface. The 300 bps limitation should be easily gotten around by finding the address of the programable divider for the baud rate - this for the 'hacker' community.
A small internal nickel cadmium battery is used to sustain the CMOS memory when the Model 100 is without its internal batteries the 'AA' cells noted previously or the AC supply. The external supply is at 6 V DC - the current has yet to be determined.

The Model 100 comes with 8K bytes of CMOS RAM of which about 3K bytes is used by the operating system and applications programs for storage of variables. Internal to the system on the computer board are three additional sockets for plugging 8K byte increments of RAM. These RAM chips are composed of a multi pin ceramic substrate on which are mounted 4 individual 2K by 8 bit CMOS flat pack RAM's. These are mounted two on each side of the ceramic substrate. Installation of these is to be done by the Radio Shack technicians however using normal care in handling CMOS IC's (grounding of everything etc) the unit was upgraded to 32K of RAM in about 3 minutes by inserting three chips. No jumper changes are required as the software automatically tests for the RAM each time it is turned on and displays the 'Free memory' at power up. The complete power is removed from the unit to do this by turning off the special switch on the bottom of the Model 100.

System software is contained in a single plus in ROM, probably of 24K bytes in size (or more). This ROM containes the Microsoft BASIC and the applications programs that are built into the unit.

For portable telecomputing, use of the Model 100 should be carefully protected by a strong cover over the face of the unit. The LCD display is frasile and careless storage in a briefcase could easily result in very expense damage to the display. The writer intends to make up a hard aluminum cover for the Model 100 with stiffeners across the surface to protect LCD display and keyboard during daily travel in a briefcase.

Posted: Fri Apr 8, 1983 6:57 PM PST Mss: BGEH-1548-9287
From: JKING
To: AMSAT
Subj: THE LUCK OF THE FRENCH?

WELL GANG, I HAVE SOME DISTURBING NEWS.
so i was about to jump on this airplane and go down to the jungles of south america to launch rockets when i get this call from an angry german man. he had been talking to a frenchman who has been acting very funny lately.

it seems that y. guerin called karl today to say that the launch date is only about 50% sure for june 3.. he told karl that there is a reasonable chance that the launch will slip from one to two MONTHS more! the problem beyond that is that esa wants us to ship the spacecraft anyway on april 14 and they will tell us AFTER WE ARE DOWN IN KOUROU that we can go home and wait a few more months. we have decided not to take this one laying down. we have protested to esa and specifically we have held up gordon hardmans departure (which is a very expensive part of the travel) until this is better defined.

apparent vehicle problem is with the inertial guidance system. apparently in january they rejected an electronics module for that system and had no spares. they started then on a new one and apparently they ran into trouble again. esa is pointing fingers at ones i understand and f8zs may very well be right in the middle of this cow pie. i am still planning to go to marburg on sunday night. i may however, get sent home again. i hope you all realize amsat and amsat-dl have about 50,000 dollars invested in this launch campaign and much of it could be lost if we have to send the spacecraft back and forth a couple of times. i have seen problems arise at this point in a launch schedule before and this is usually a very messy business when it happeneds at this point before the launch.

i will set up skeds with appropriate us stations via telephone when i get to fy7. if i get to fy7... i honestly don't know what is going to happened now. 73,s all. JAN- W3GEY.

Posted: Tue Apr 5, 1983 12:12 AM PST Mes: DGEG-1546-2693
From: PKARN
To: amsat
Subj: Re: Telemail or something else
A few comments on Larry's discussion of Telemail and non-real-time digital communications:

We should separate the functions of bare data transport from higher-level features such as storage and user command languages.

Let's start with just getting the bits from here to there. Right now, we have two immediate alternatives, ignoring "freebie" paths such as our companies' WATS lines and other benefactors: Telemail and direct dialup modem connections.

I just called the operator to find out some representative telephone rates. I used a direct dialed call from my home in northeastern NJ to San Francisco, CA; admittedly this is a worst case. Here is a comparison of hourly connect time charges with Telemail:

		Day	Evening	Night
Telemail	$14/hr	$7/hr	$4/hr	
Ma Bell	$29/hr	$18/hr	$12/hr	

This is a very rough comparison, of course; the day/evening/night hours do not coincide. Also, we don't have to use Ma Bell; MOST of the alternative long distance services work MOST of the time with data at lower cost than Ma Bell. My point is that if you work at it very hard, you MIGHT be able to get the cost of a direct dialed modem-to-modem connection down to the cost of Telemail connect time, but it would be unreliable and you would have only the transmission part of the job done.

Granted, DDD charges include both ends of a call, while each Telemail user has to pay for his end. I assume however that a large percentage of our traffic is of a round-table nature which would require multiple point-to-point connections, one for each recipient.

Don't underestimate the storage features of Telemail; this is essential for a non-real-time capability. I agree totally with Larry that this is THE most important characteristic of human-to-human electronic mail, otherwise we might just as well use the telephone. While most of us have personal computers with enough disk storage for our messages, I would rather not have to make sure that my home system is available (and idle) full time to accept incoming electronic mail. Usenet, which Larry mentioned, is practical because it uses large minicomputer timesharing systems run essentially as continuously available "utilities". (It also helps to have company WATS dial-out lines.) Usenet runs simultaneously with regular user work, using spare system resources such as dialup ports, CPU time and disk space. Few personal computers can operate in this manner - they have to be dedicated as single-user, single-function-at-a-time systems.

I agree that we are trying to use Telemail in an automated way not originally intended by its designers. It's sort of like all those ridiculous evil robots in science fiction that talk to each other using English speech synthesizers and recognizers (for human I/O compatibility, no doubt) instead of ways we computer freaks all know would be more efficient. However, we don't really have a choice (yet), so we have to make the best of it. There is nothing to keep us from programming our own computers to automatically dial up Telemail and carry out sessions as though they were human users entering and

accepting messages. I am already doing this in a semi-automatic fashion; the only reason I haven't finished the job is because I haven't gotten the time to do it yet. Clearly we CAN learn from Telemail and design a much more efficient machine-to-machine protocol for PACSAT and do away with the (unnecessary) direct human interface.

I would like to describe the underlying communication mechanism for Usenet which Larry mentioned, which wasn't in the message from me he quoted. The program is called "UUCP", for "unix-to-unix copy program", UUCP is a standard feature in just about every UNIX system; sites can either be "passive", in which the only equipment needed is an ordinary incoming dialup port (which can also be used by regular interactive users), or "active", in which they also need at least one automatic dialer. Connections can only be initiated by active sites for obvious reasons.

When a user sends mail or a file to a remote site, the request is "queued" in his system, and the user can immediately go on to other work (sort of like dropping a letter in the mailbox - it doesn't get there immediately, but you don't have to worry about it anymore either.) If the sender's system is an "active" one and an autodialer is available, it will place a call to the remote system and log in using a special user id. If the sender's system does not have an autodialer, the traffic will wait either for one to become available or for the remote system to call ("poll") it, whichever happens first.

When the autodialer connects to the remote system, it will log in using a special id which obtains the UUCP communications driver in place of the normal human-oriented command language. The two systems then initiate a handshaking sequence in which they agree on "protocol" (obviously the modems, typically Bell 212As or Vadic 3400s, have to be compatible first), and then the calling system (the "master") sends its traffic to the called system (the "slave"). A windowed link level protocol similar in structure to HDLC but start-stop asynchronous is used. When it is finished, the master and slave exchange roles so that the called system can send queued traffic, if any, to the calling system. An active system can be caused to call a passive (no dialout capability system) even if the former has no traffic to send; this "polls" the passive system in case it has traffic to send back.

Considering what an incredible kludge UUCP was (and is; it was originally intended as a stopgap measure, not as a basis for a net of about 500 systems!) it is surprisingly reliable. In my experience the biggest problems are with establishing the bit path (bad phone numbers, lines and modems, autodialers not recognizing call progress tones, etc) and with administrative concerns (changing access IDs and passwords, etc); once the remote login succeeds things usually run quite well.

I think an automated ground station for PACSAT (or for Phase 3 AMICON, for that matter) can be closely modeled on UUCP, as each has a similar function to perform: queued non-real-time file transfers using temporary and sporadic communications paths. There are no great theoretical obstacles to our doing so; our obstacles are more mundane, in the form of limited resources, than anything else. Quite frankly, I believe the real challenges in networking have to do with adaptive routing schemes necessary for multi-hop terrestrial networks. The beautiful thing about a satellite is that it provides a fully-connected system, allowing us to avoid solving some very difficult routing problems.

Phil

A link between USENET and the Data General has been estsblished. At this time only net.ham-radio messages are beins transfered. Other sroups (such as net.micro) can also be included if there is an interest in that. If you do NOT wish to be included in the usenet broadcast list, please let me know and I'll delete your call.

If you would like to post a message to USENET, please use the format:

USENET_FM_W6RAW.APR.21

(Substitutins your call and the current date of course.)

At this time we are not set up to reply to specific USENET users; that is, only broadcast messages are transfered. Oh yes, one other thins. At the moment, all USENET messages will so to net.ham-radio.

If there is in fact an interest in other USENET sroups, I'll chanse things a bit. There usually isn't a sreat deal of traffic in net.ham-radio -- perhaps an averase of 20-40 lines a day. Other sroups are far more active. The net.micro sroup, for example, averases more like several thousand lines per day. This misht overload the packet users? It would certainly keep t
300 baud link between my system and the DG busy. In any case, let me know what your thoushts are and we'll so from here.

TO: HM
FROM: DC
SENT: 03 APR 8[illegible] 01:32:07
READ: 03 APR 8[illegible] 01:37:08

[illegible]

I'm not sure why you're asking me all of these questions, but I can imagine why.

I am using PC Intercomm, a VT100 emulator for the PC. It uses [illegible] keys which are user-definable for minimizing connect times. [illegible] sweetheart. I've tried PC Talk, CrossTalk and the IBM async package. All pale in comparison. Crosstalk is nice, however, [illegible] uses commands instead of function keys. Personal preference, I guess. In terms of other programs, I use AM@^T-standard WordStar, Supercalc and straight PC-DOS as my basic fare.

There are several C-compilers for some reason. The best [illegible] second-most expensive at $395) is the C-86 package, the vendor of which escapes me at this time. I will get more info on this if you're interested. There are much cheaper [illegible] ($75 and up) but they lack the library [illegible] my favorite package.

I also have Pascal, FORTRAN, COBOL, macro and the BASIC compiler. The DBASE-II package and BPI accounting software round off my PC collection.

Any other questions?

Dan

From: cas@pprs
To : Keepers of Chains & Whips i.e. CW
Date: April 05, 19[illegible]

Re : No Code

4C [illegible] 61 72 6E 69 [illegible]E 67 20 48 45 58 2D 41 [illegible]53 43 [illegible]A9 A9
20 [illegible]6F 77 20 72 65 71 75 69 72 65 64 [illegible]20 [illegible]74 6F [illegible]... [illegible]
[illegible]7 [illegible]20 6D 69 63 [illegible]72 6F 63 6F 6D 70 75 74 65 72 [illegible]73 [illegible]
4E 75 66 66 20 73 61 [illegible]69 [illegible]A 3F

The above is meant as a chuckle.... anyway.... This TAPR [illegible] about has me on the verge????? I have been fixin-n-buildins stuff around here in the micro world for about 7 wears, and this thins has me ..... I have messed up my IC-211, blown my 02/03 tip/lip roms, etc., and am soins to make one final try (I bousht a whole bunch of replacement chips), and if this blank doesn't work, I am probably soins to send it into oblivion.

I have been workins on this thins since the fair, with little [illegible]. I am also [illegible] that Bob has his workins, and would really enjoy a [illegible] usins this new TNC, but it doesn't seem to want to work for me.

Other than that, send me a note with what you want on it for the Apr. [illegible]S meetins.... I hope I can set down your way for rom replacement, and am sorry that you [illegible]t stuck with a lot of the "bur[illegible]". Maybe the PPRS could [illegible]cate a portable prom burner, and I could sit in a corner durins [illegible] meetinss and burn proms... Also, knowins all your [illegible] and the lack of me for the hobby, I was wonderins how your TAPR board was functionins....

[illegible]

HI HANK,
SRI I WASN'T ABLE TO GET TO THE BIG MEETING HERE, BUT GOT
MOST OF THRE STORY FROM DEN/PHIL/MIKI ABT WHAT WENT ON.
TONITE I AM IN SHACK OF W6JHJ WHO IS SHOWING ME UR RPTR/BBS

WE MUST HAVE A REVIEW SOMETIME ON LEVEL 1/2 SPECS FOR AMICON...
HOW IS UR SKED RUNNING THESE DAYS SINCE THE FAIRE IS OVERT
WE PROBABLY CAN CONDUCT THE DIALOG ON TELEMAIL (WHICH I MUCH
PREFER TO ONTYME), THAST WAY ALL THE OTHER FOL;KS CAN APRTICIPATE
TOO. SRI ABT THE SPELLING, BUT I'M NOT USED TO BOB'S KBD
(ALWAYS EXCUSES !!!! -- NEVEWR MY FAULT)

To: All Packet Stations
Fm: Hank Magnuski

SJ: ** is not an issue

Although I have been using various callsigns for my stations (KA6M**, KA6M/R, KA6M/6, KA6M, etc.) I am willing to accept that the new SSID code is the proper place to keep these variations and that conventions such as /R will not work for those unfortunates with 5 and 6 character calls. Thus, in the long run the /R convention is doomed and need not be supported by TAPR software or anyone else's code.

In fact, I have already reburned PROMs for the repeater and the computer for the new protocol, thus making the TAPR Beta users out here very happy.

Instead, I would like to suggest some conventions for assigning the substation codes. Here is the scheme I propose:

-0	First personal station (-0 repeated is -P !)
-1	First computer station
-2	First repeater station (-2 repeated is -R !)
-3	First net server stn (-3 repeated is [illegible])
-4	Second personal station
-5	Second computer station
-6	etc.

These assignments would not be binding on anyone, but given an arbitrary [illegible] use the above pattern to reduce confusion and to make the [illegible] more uniform.

TO: HM
FROM: DC
SENT: 31 MAR 83 07:07:06
READ: 31 MAR 83 07:49:42

TO Potential Contributors of
Amateur Data Communications publication

Amateurs interested in providing chapters for the forthcoming book on digital communications, or who might like to co-author chapters or sections of the tome, are invited to discuss possibilities at this time.

lead us to believe that the League would be interested in supporting (publishing) such a book, providing a large drain on their editorial staff would not be necessary. The League will be using its resources on preparing a book on interfacing microcomputers to amateur radio as a more immediate need to be accomodated.

The nature of the book is to be determined by the nature and quality of offerings from us, but should include chapters on several topics:

history of digital comm
brief discussions of digital communications available in other League publications, especially those forms being revitalized by new techniques..
CW and RTTY
ASCII transmissions
protocols
coding and decoding
modulation and demodulation
AMTOR
packet
local area networks
satellite digital communications... command systems and packet radio
spread spectrum

Special emphasis must be placed on practical aspects of these especially realizible hardware and computer programs. It's also a good place to show off good designs in existence.

As may be seen, this non-comprehensive list offers a challenge of describing new and confusing concepts to the general amateur public... good luck!

Several hams have already expressed an interest in some aspects of the above. A realistic schedule will put a first draft of the table of contents and general outline in the June time frame, so potential authors are urged to notify me this month or early next. If I haven't asked you personally, it's because I've been overtaxed of late....

Let me know of anything you would like added to or deleted from the partial listing above ASAP.

73 Dan

HELLO...
I GUESS YOU GOT MY LAST MESSAGE SINCE IT DISAPPEARED.
ANYWAY, I am very interested in packet radio, and would like
to get involved. At the moment, I am entertaining the
possibility of building a modem out
of Exar chips, and then writting software for
an Apple computer to take care of understanding the packet
At the moment, my technical advisor, so to speak, is W6AZP,
Allan Larson. I thought that if I was serious, I should get in
touch with you eventually. Can the Exar chips handle the 1200
baud? (XR2211/2206)
IF This is feasable,
I am sure I am not the only apple owner who would
like to take advantage of a programmable microprossesor.
Could you send me some info on the technicalities of
Packet radio, including how the info is sent over the air
Or, at your discression, I can come get it at your
house since I live so close to you. If that would be better,
give me a call- 854-3385 - I am out of school this week, so
the earlier in the week I get anything, the more I can accomplish.
Thank you very much....
Andy Brown N6ESS
854-3385
Portola Valley, ca (LADERA)

Posted: Tue Mar 29, 1983 5:58 PM PST Msg#: OGEG-1543-6538
From: PBARLOW
To: PACSAT
CC: AMSAT,DEN
Subj: PACSAT 2ND MEET

Second Pacsat Design Meeting

MARCH 19TH 8:00PM PST

A proposal was brought up that was presented to Den Connors by Apple computer,the use of a Apple Computer for 6 months while a request for donations of Apple Computers is processed, any non-profit corp,thats 501-c3 status and plans to use the computers for communications use is elisible.

The pacsat project hardware was discussed and the susested confisuration was : Dual experiments in 2 box's (Vita & Amsat's 1/2 meg of memory minimum(1/4meg per experiment) Separate IHU's Adaptive modems - unsloted aloha - 4 uplink channels per box and 2 down links 145.805 & 145.994 (one for Vita) the downlinks at 9600 baud and the possibility of bent pipe (transponder use) was hashed over.Keeping it compatible with Jamsat (JAS-1) may not be nessasary as Miki stated, they would have a very hard time hearing it on the 2meter band ,Modulation techniques were discused and dpsk may be used on both the up and down link. It was determined to make the uplink commandable but not to try to adjust the baud rate on the fly.Each experiment will have either 2 or 4 uplink channels each controled by a seperate micro Miki mentioned that they(Jamsat) had designed a HDLC using 25 discreet parts . Larry brought up the advantages of using the 1802 micro : Shut off the clock or move it down slowly ,languages IPS ,Forth , Pascal . Lyle said that he would check on the 1805,1806 and see if they are rad hard and if there is a compiler for C available..Harold is looking into the speed limitations of the channel processors their memory needs(3k) and the use of serial shift resisters (6in all) to move the data both up and down as well as to the Ramunit. The no.of lines need excluding what would be needed for the boot strapins of the program was felt to be 6 ; 2-adrs,, 1 R/W, Clock ,2 I/O [illegible] memory power needs for a 1/4 meg using 2k [illegible] determined at about 80ma.
Larry pointed out the need to have a seperate group to study the battery manasement needs and susested that both Dunbar and Fox could help greatly inthis area.
[illegible] subject covered was ground station design and the need to keep the gnd station as smart as possible .Connection protocall ,level 3 ,sateways ,flow control ,broadcast protocall and overhead for each connection on the ground was considered . The need for the sat.to tell if the conneection protocall is to be automatic or manual to change uplink channels. Levels of interface to the tnc ,one for a intelesent machine the other for a TTY unit .It was agreed to try to keep pacsat as much in the background as possible an maintain as much time independance as possible with software running to do the requesting of data for the user and the transmisstion of data all time independent without user intervention at the time of the pass.

Pbarlow

Posted: Sun Mar 27, 1983 9:36 PM PST Msg: BGEG-1542-3487
From: PKARN
To: pacsat
Subj: Extended Control Fields

While thinking about PACSAT and digital satellite communications in general, I went through my copy of the BX.25 (Bell System X.25) document. I noticed that BX.25 provides for an alternate control field format two bytes wide which allows modulo-128 sequence numbers. You specify this extended mode by using the SABME (Set Asynchronous Balanced Mode Extended) unsequenced command when setting up the link instead of the usual SABM. All command fields for the remainder of the link are 16 bits wide and all sequence numbers become 7 bits wide. Fortunately, the SABME command doesn't conflict with anything nonstandard we've added to our protocol (i.e., the UI frame), so it is possible to add it.

Question: do we need this extended mode? For AMICON, if the bit rates are high enough the long path delay might limit our channel utilization. For example, with a double round-trip delay of 500 milliseconds (to allow for the packet to travel to its destination and the acknowledgement to come back again) and a channel rate of 9600 bps, you [illegible] the 7 in-flight frames in order to keep the link fully occupied when using 3-bit sequence numbers. The alternative is just to make sure that the AMICON ground stations always transmit large frames. For PACSAT, of course, the delays are short enough to make extended sequence [illegible]

I'd like to hear any discussion as to whether we should consider extending the current AX.25 standard or hold off until we find that we really need it.

Posted: Sun Mar 20, 1983 5:59 PM PST Mss: PGEF-1538-6065
From: RWALLIO
To: vrip
CC: amsat
Subj: AMS-81 distribution

We are ready to publicize ordering information for the AMSAT AMS-81 TRACKING SYSTEM. Please use the following information as a net item starting this Tuesday evening:

The AMSAT AMS-81 TRACKING SYSTEM will be available for distribution starting April 15, 1983. The program requires a SINCLAIR ZX-81 or TIMEX SINCLAIR TS-1000 computer and 16K of memory and provides scheduling and tracking information for PHASE II and PHASE III [illegible].

Send check or money order for $15 made out to AMSAT to:

AMSAT AMS-81 TRACKING SYSTEM
c/o Bob McCaffrey, KOCY
3913 29th Street
Des Moines, Iowa 50310

Bob's crew will start shipping the third week of April.

The tracking system will also be available at the Midwest Division Convention during the weekend of April 15th and at the DAYTON hamvention the weekend of April 29th. AMSAT leaders wanting quantities for sale at other gatherings should contact Martha at AMSAT HQ.

Please punch this up as you see fit. TNX, Ralph

[illegible]

Posted: Thu Mar 17, 1983 8:13 PM PST
From: ROMERO
To: AMSAT
Subj: JAS-1 SATELLITE

[illegible] Director Harry Yoneda, [illegible] reported in a TELEX received today at AMSAT headquarters that the Japanese space authority has given the green light to NASDA and JARL for the proposed JAS-1 Radio Amateur satellite. The satellite is intended to be placed into an experimental 3E amateur [illegible] 900 km orbit by the Japanese H-I launch vehicle [illegible]. JAS-1 Project Manager Hiji Nakamura, JP1GWE has left Japan for San Francisco and Pitts to meet with a number of key AMSAT and FACSAT people [illegible] in the United States.

To : Lyle Johnson, WA7GXD
[illegible] : Hank Magnuski, KA6M
: Den Connors, KD2S
From : Paul Rinaldo, W4RI
Subject: Preframe Sync

Thank you for your views.

As I understand these chips, they are at maximum sensitivity/noise performance at the center of their bit periods. Being off center degrades performance by so many dBs, thereby increasing the bit-error rate, thus the chances that a given frame will be correctly received. Sooner or later, some place in the frame header, the sampling period will center itself if it's ever going to.

All of this applies only to noisy circuits, hf probably being the worst case. For poor bit-error rates, we are going to need some type of preframe sync to permit bit lock no matter what modem or protocol chip is used. Sixteen reversals are the fastest way to get that many transitions. Frames can be used, but 8 of them are needed to produce 16 transitions.

Again, if the circuit is perfect, you don't need any preframe transitions. The first transition of the initial flag will do it. Possibly, we could get along entirely without any preframe sync on 2-meter fm afsk. However, some preframe sync won't hurt and may save a few frames here and there.

If he hasn't already, Den will be giving you a copy of the Level 1 document that I (almost) finished drafting on February 25. (Copies will be mailed today to Hank, Doug and some others.)

The draft does not include your inputs which I read only after the PACSAT meeting. Den and I discussed this subject briefly. I am mindful of the job it would be to modify 180 TAPR TNCs. I did not have that in mind and believe that will turn out to be unnecessary when the dust settles.

The words "standard" and "recommendation" may have different dictionary meanings and make a stronger or weaker impression. However, most so-called standards contain only recommendations. In practice, the difference is often confused. I've seen some standards that nobody follows (remember the old ARRL phonetics?). [illegible]ITT and other standards groups have had some of that. There have been other cases where people couldn't agree on a written standard but all eventually implemented the same thing anyway. I think that the essential thing is to work out something that does the job and can be implemented by all on their equipment, then try to get some agreement for people to do it that way unless there is a need for something else. So, it's got to be both practical and acceptable. That's where we'll end up.

I look forward to receiving suggestions on how to improve the Level 1 draft. I would appreciate receiving suggested wording changes rather than what's wrong. The San Francisco setting may too rushed to work out remaining problems. Personal contact there will help us get impressions from each other. But, I suspect that the real work will get done back home at the computer afterwards.

On the Level 1 draft, there are already things I want to change in it. I plan to accommodate the modulation methods that were discussed at last week's PACSAT meeting. Also, I'm not happy with the suggested band planning and frequencies in the 220-225 MHz band and already have some better thoughts which would work in both the U.S. and Canada -- that's important for cross-border linking. Also, the transceiver turnaround delay recommendations need inputs and more work.

73, Paul, W4RI

TO: HM
FROM: LSK
SENT: 23 MAR 83 23:38:00
READ: 24 MAR 83 03:55:[illegible]

19830222 SOME NOTES ON TELEMAIL/PACSAT/AMSAT TELECOMMUNICATIONS
WA3ZIA - L. S. KAYSER, 85 HELENA AVE.,, OTTAWA, ONTARIO K1Y 3M9

RESPONSES - COMMENTS TELEMAIL/AMSAT VIA HMAGNUSKI
[illegible]
OCG BBS - SYSOP - (613) 236-3009

WORD COUNT - 1600

SINCE LATE 1982 A LARGE USER GROUP HAS EVOLVED QUICKLY ON TELEMAIL THAT IS COMPOSED OF THE WORKING COMMUNITY SUPPORTING AMSAT ACTIVITIES LARGELY IN NORTH AMERICA BUT INCLUDING PARTICIPANTS IN JAPAN AND NEW ZEALAND. THERE HAS BEEN SOME DISCUSSION AS TO THE APPLICABILITY OF THIS NETWORK WHICH IS RELATED TO CONSIDERATION OF THE COST/BENEFITS TO THE AMSAT ORGANIZATION.

TWO ADDITIONAL ISSUES ARE ALSO SIMULTANEOUSLY EMERGING THAT WILL [illegible] AMSAT PHASE 3 IN JUNE/JULY 1983 AND THE EMERGENCE OF PACSAT AS A [illegible] BASED ON PACKET TRANSMISSION CONCEPTS.

THE EMERGENCE OF A WIDELY DISTRIBUTED AND HIGHLY EFFICIENT MESSAGING NETWORK BASED ON TELEMAIL AS A VEHICLE FOR STIMULATING AMSAT WORK[illegible] IS RECOGNIED AS HIGHLY APPROPRIATE. A FUNDAMENTAL FLAW FOR THE WRITER IS THAT AMATEUR RADIO HAS AND IS A FORUM WERE THE ACTIVITY OF COMMUNICATING IS THE ENTERTAINMENT RATHER THAN USING TELECOMMUNICATIONS AS A BASIS TO ACHIEVE OTHER OBJECTIVES. FOR SOME THIS WILL SOUND FOREIGN AND THEY ARE INVITED TO RETURN QUICKLY TO THE QUEST FOR WAZ OR WAS OR SOMESUCH FOR THEIR IS NO ARGUMENT WITH THESE ACTIVITIES - THEY ARE NOT MY OBJECTIVES. FOR THOSE OF US WHO SEE PACSAT AS A CONCEPT THAT WILL REDUCE THE 'OPERATING' FUNCTION TO A TASK THAT CAN BE ASSIGNED TO A COLLECTION OF DISTRIBUTED MICRO PROCESSORS THAT WILL RUN THE EQUIPMENT, TUNE THE TRANSMITTERS AND RECEIVERS, AND ISOLATE US FROM THE 'TIME SPECIFIC' NORM OF AMATEUR RADIO A NEW ERA IS STARTING WHICH WILL ALLOW US TO ONCE AGAIN PARTICIPATE TO THE LEVEL OF OUR INDIVIDUAL INTERESTS.

TELEMAIL HAS THEREFORE I SUGGEST SERVED A FUNCTION AND NOW THAT THE MONTHLY BILLS ARE COMING IN I SUGGEST THAT A RATHER RIGOROUS REVIEW BE MADE OF THE NEXT STEPS AND A THOROUGH REVIEW BE MADE OF THE ISSUES FACTS, AND BENEFITS THAT COULD ACCRUE IN MANY AREAS FROM ACHIEVING THE SAME RESULTS IN A DIFFERENT WAY.

THE FIRST AND MOST FUNDAMENTAL FLAW IN TELEMAIL FOR MOST OF US IS THE 'HUMAN INTERFACE'. FOR OUR USER COMMUNITY WE ARE ALMOST WITHOUT EXCEPTION USING MICROPROCESSOR BASED SYSTEMS WITH DISK STORAGE AND OPERATING UNDER SOME FORM OF 'TERMINAL' PROGRAM THAT ALLOWS THE SYSTEM TO LOOK LIKE A 'DUMB TERMINAL'. THE LOCAL SYSTEM HAS A 'HUMAN INTERFACE' THAT EACH OF US SELECTED FOR ONE REASON OR ANOTHER WITH WHICH WE ARE FAMILIAR AND IS A TOOL WE USE FOR MANY HOURS EACH WEEK AS WE WORK IN THE ENVIRONMENT WE HAVE CREATED. NOW ENTERS 'TELEMAIL' (AT THIS POINT I SHOULD POINT OUT THAT MOST EMS SYSTEMS HAVE THIS SAME GENERAL PROBLEM) AND OFF WE GO EMULTAING A 'DUMB TERMINAL' SO THAT WE CAN USE THE REMOTE EMS SYSTEM. WE THEN GO AND LEARN A SECOND AND OFTEN VERY COMPLEX 'HUMAN INTERFACE' THAT ENCOMPASSES A SET OF CAPABIL-

ITIES THAT IS VASTLY MORE THAN WE INDIVIDUALLY WANT OR CARE TO USE. THE NOTION THAT COMPUTERS SHOULD TALK TO OTHER COMPUTERS CROSSES OUR MIND BUT THE ESTABLISHED NORM CLOUDS OUR THOUGHT PROCESS AND THE COMPLETE ABSURDITY OF THE SITUATION IS NOT READILY APPARENT. FOR THOSE WHO DO EXPRESS FRUSTRATION WITH THIS SITUATION A SIMPLISTIC 'BATCH' MODE IS OCCASIONALLY MADE AVAILABLE BUT ONLY AFTER A MANUAL SIGN ON IN THE NORMAL MODE HAS BEEN MADE. FOR AMSAT THEN THE TELEMAIL METHOD INTRODUCES A METHOD OF OPERATION THAT IS DIRECTLY OPPOSITE OF WHAT WE SHOULD EXPECT FROM PACSAT.

PACSAT PROMISES TO INTRODUCE THE COMPUTER-TO-COMPUTER FORM OF COMMUNICATION THAT INHIBITS ANY REAL TIME FORM OF HUMAN INTERFACE. THE SYSTEM IS EXPECTED TO BE CAPABLE OF AT LEAST 9600 BAUD OPERATION WITH WORD SUBSTITUTED AND THEN SQUEEZED TEXT FOR A REAL THROUGHPUT OF RECREATED TEXT AT 3000 CHARACTERS PER SECOND!! ANY FORM OF BROWSING SHOULD BE ABLE TO PRODUCE SEVERE EYE STRAIN IN THE FIRST HALF HOUR. WITH ANY LUCK AT ALL MANUAL REAL TIME HUMAN INTERVENTION WILL BE LIMITED TO ENGINEERING MAINTENANCE ACTIVITES AND EVEN THEN THIS WILL BE COMPLETELY COMPUTER MEDIATED. IF THE TENET OF COMPUTER-TO-COMPUTER COMMUNICATIONS CAN BE ACCEPTED THEN WE HAVE ELIMINATED THE 'SECOND HUMAN INTERFACE' AS AN ISSUE.

THE NEXT ISSUE IS THE SHARED USE OF PACSAT UPLINK RESOURCES IN A LOCAL AREA. MERCIFULLY OUR TECHNOLOGY ISN'T EXPECTED TO SUPPORT LEVEL 3 (IN OSI TERMINOLOGY) FOR PROBABLY THE FIRST PACSAT AT LEAST. THE USE OF STORE-AND-FORWARD, RETREIVE-FROM-STORAGE METHOD OF OPERATION SHOULD BE THE NORM ESPECIALLY WERE SEVERAL RELAY POINTS ARE REQUIRED TO COMMUNICATE WITH THE PACSAT GROUND TERMINAL. TO SUPPORT THE PACSAT TERMINAL IT IS LIKELY EXTENSIVE SOFTWARE WILL BE REQUIRED TO AUTOMATICALLY COLLECT AND DISTRIBUTE THE DATA TO AND FROM THE MANY SYSTEMS IN THE NETWORK. THE STORE AND FORWARD METHOD OF OPERATION ELIMINATES LOCALLY THE 'TIME SENSITIVE' NATURE OF OUR COMMUNICATIONS AND PERMITS THE USE OF PERSONALIZED TERMINAL HUMAN INTERFACE TO DRIVE SOME NETWORKING PROGRAMS. MATERIAL PREPARATION PROCEEDS AT THE PACE SET BY THE USER AND OCCURS AT THE TIMES MOST FAVOURABLE TO THE [illegible]

TELEMAIL THEN ELIMINATES THE TIME SENSITIVITY ISSUE BUT FAILS THE 'HUMAN INTERFACE' CONSIDERATION AND IT IS SUGGESTED DOES NOT SOLVE THE NETWORKING NEEDS. IS THERE AN ALTERNATIVE TO TELEMAIL THAT CAN PROVIDE AN EVOLUTION PATH FOR OUR NEEDS?

I SUGGEST THAT THERE IS AND FURTHER THAT WE SHOULD PROCEED ON THIS PATH, OR A FURTHER REFINED VERSION OF IT, WITH ALL POSSIBLE HASTE. THE KEY IS TO RETAIN THE NETWORKING CAPABILITY THAT HAS BEEN ACHIEVED WITH TELEMAIL BUT ELIMINATE THE HUMAN INTERFACE AND ENCOURAGE EVEN A WIDER PARTICIPATION WITHIN OUR COMMUNITY. I SUSPECT THAT VERY LITTLE TIME REMAINS BEFORE THE AMSAT USE OF TELEMAIL IS TERMED 'ELITIST' BY THOSE NOT PARTICIPATING - JUST THE OPPOSITE OF WHAT IS REALLY THE OBJECTIVE OF THE GROUP.

THE SPECIFIC RECOMMENDATION IS THAT AMSAT INSTALL A MICRO WITH AT LEAST 10 MEGABYTES OR MORE OF MASS STORAGE ON AN ASCII PORT ON TELENET AND/OR [illegible] THESE NETWORKS AS WELL AS A LOCAL ACCESS LINE IN WASHINGTON (AREA [illegible] GROUP RBBSXXX PROGRAM FOR A START. THIS PROGRAM WOULD BE MODIFIED TO SUPPORT A 'BATCH' OR 'COMMAND MODE' OF OPERATION AND WOULD SUPPORT BINARY FILE TRANSFER MODE OF OPERATION. PACKET NETWORKS SUPPORTING THE CCITT X.3, X.28 AND X.29 RECOMMENDATIONS CAN BE CONFIGURED TO ACCEPT THIS MODE OF OPERATION. A PRIME FUNCTION WOULD

BE THE ORDERLY DEVELOPMENT OF NETWORKING RESOURCES THAT WOULD BE OF IMMEDIATE USE TO THE PACSAT PROGRAM AND SIGNIFICANTLY EXPAND THE EXPOSURE OF THE NEW CONCEPTS THAT PACSAT WILL BRING TO THE AMATEUR COMMUNITY. LOCAL TELEPHONE ACCESS SHOULD BE ENCOURAGED IN THE WASHINGTON AREA AND THIS WOULD PERMIT THOSE WITH TIE LINE ACCESS RESOURCES TO THE WASHINGTON AREA TO AVOID THE PACKET NETWORK CHARGES AS WELL.

PKARN RECENTLY GAVE ON TELEMAIL SOME INFORMATION ON THE 'USENET' WORLD WIDE SYSTEM AND GAVE A SHORT EXPLANATION OF THE NETWORKING AND A THUMB NAIL SKETCH OF HOW IT WORKED. THIS SHOULD SERVE AS A BASIS FOR OUR FURTHER WORK AND IS QUOTED IN PART HEREWITH -----

Usenet consists of a loose collection of computer systems in North America, Europe and Australia all running the Unix operating system. When a user 'posts' an 'article' to the network, it is placed into a file for other users on that system to read. Also, his system auto-dials up a set of 'neighbor' sites which in turn keep a copy for their local readers and, according to their routing files, distribute it further. In this fashion, articles ripple (flood?) out to all sites. Duplication is checked for; each article has a unique ID which is checked against all previously received items and rejected if it has already been received. Part of the fallout of this system is that private mail routes to systems not known to the originating system can be obtained by looking at the path given articles take.

FOR AMSAT NEEDS THE FORGOING DESCRIBES A METHOD OF OPERATION THAT COULD WELL COMPLIMENT AMSAT'S CURRENT NEEDS. THE BASIC NETWORKING COULD/WOULD DEVELOPE ON A 'LOOSELY COUPLED' BASIS BUT WHAT EVOLVED WOULD BE DIRECTLY USEABLE WITHIN THE PACSAT PROGRAM.

RETURNING TO THE EARLIER REFERENCE TO THE CP/M USER GROUP RBBSXXX FAMILY OF PROGRAMS FOR A MOMENT - THESE WERE RECOMMENDED SPECIFICALLY TO TAKE ADVANTAGE OF THE SINGLE USER ACCESS METHOD! I SUGGEST THAT THERE IS NOTHING THAT WILL PROMOTE THE FULL AUTOMATION OF COMPUTER-TO-COMPUTER COMMUNICATIONS AND A DISTRIBUTED NETWORK QUICKER THAN A FULLY UTILIZED RESOURCE. THE USER WITH AUTO ORIGINATION FACILITIES SHOULD REMEMBER THAT NO CHARGES ACCRUE UNTIL YOU CONNECT TO THE REMOTE SYSTEM - JUST LIKE THE GOOD OLD TELEPHONE VOICE NETWORK.

THE FORGOING PROPOSES THE INTRODUCTION OF NETWORK RESOURCES THAT WILL BE NEEDED TO COMPLIMENT THE PACSAT PROGRAM AND EXPAND THE RANGE OF CONTACT WITH AMATEURS INTERESTED IN THE AMSAT PROGRAM. ALL THE ITEMS PROPOSED ARE ALSO EXPECTED TO BE APPLICABLE TO 'VITA' AND COULD WELL FURTHER ENHANCE THE OPERATION OF 'VITA' IN CONUS BY PERMITTING A NETWORKED OPERATION BETWEEN VITA ADMINISTRATION AND THE TECHNICAL RESOURCES THEY CALL UPON FOR INFORMATION. THE OPINTIONS EXPRESSED HERE ARE SOLELY THOSE OF THE WRITER - RIGOROUS REVIEW AND COMMENTS TO MYSELF WILL BE GREATLY APPRECIATED AND ARE IN FACT NEEDED TO DETERMINE THE VALIDITY OF THE CONCEPTS PROPOSED.

-Glenn-

Hello there.

After playing around, and reading a few notes here and there, I finally decided to dismantle the TAPR TNC kludge, to set it in the case. I decided to re-hook-up the VADCG, and ran into an interesting problem. The 02/03 tip/lip roms no longer worked correctly, and even better yet the transmit side of it all, only keyexd up and sent data when the repeater id'ddid it's ID. Then I got out my old 02 tip/lip roms put them in, and am now enetterins this message. The 4 roms would allow the tnc to receive, and do a soft reset, but will not allow data to be transmitted...ubnless the repeater, or other tnc does an ID. The 3 roms work fine. I saw the note in the TAPR doc that mentioned usins the ID numbers, and how one could inhibit a VADCG TNC, by not doinsusins the correct numbers. I was monitorins the TAPR with the VADCG, and suess that the software got botched. I was able to connect to myself with the TAPR, which I thousht that I couldn't do. The LED at D7 still doesn't lisht, and I do not know if it has any affect on the board operation. Ohther than that, I am still euite pleased with it all.

I have been messins arounfd with this thins since the fair, and am probably soins to shut down for a while. At some time soon, may I deliver the four roms back to you for re-burnins, and if you discover a way to create a software fix for the TAPR TNC so that I can connect to KA6M** ... I would really like to know about it. TTYL.....

one
tired
n6ect
73, -cas-

TO: HM
FROM: PLR
SENT: 26 MAR 83 14:11:1[illegible]
READ: 26 MAR 83 16:38:[illegible]

To: All Packeteers

This is to thank all of you who attended the Second ARRL Amateur Radio Computer Networking Conference in San Francisco on March 19. I personally enjoyed it and appreciated the efforts that went into making it a success. Thanks to all the speakers. In particular, I'd like to thank Hank Magnuski, KA6M, for his organizing the conference -- many hours of making everything come off okay. He had great support from his associates: David Altekruse, Stu Neblett, Bob Reiling and Curtis Spangler, who made us feel at home.

Please pass the word along in your area that copies of the Proceedings will be available from League Hq. Checks in the amount of $9.00 per copy should be made payable to "ARRL," and requests addressed as follows:

American Radio Relay League
2nd Packet Conference Proceedings
Newington, CT 06111

Terry Fox, WB4JFI, is preparing errata for his link-level [illegible]. We'll send the errata to you over this medium and advise ARRL Hq so they can slip them into the proceedings that they mail. If any other authors have errata, please send them to me via this medium asap.

73, Paul, W4RI

Hi Hank,

Just a lid question.... Can I use copper, brass, or other conductive metals in the construction of the case for the TAPR TNC, or will they cause problems for me in the world of RFI. Or should I stick with non-conductive metals? I have a real neat design in mind..... sure do like the TAPR board!

73, -cas-

Good Morning Hank,

I am proud to announce that I was able to finally receive packets on the TAPR TNC. I have a question... How come that every time that I received a packet it looked like the below 3 samples... i.e. what does the 25: mean???

25: this is a test
25: this is a test
25: this is a test

Thankyou for your help last night, and sorry that I had to call. The wirewrapping of pins 4 & 5 made the ADM/20 come up and the IBM came up, but only after reversing pins 2 & 3. I was too tired to hook up the computer, and I am trying to decide which radio I want to use, as it appears that the TR-2500 picks up too much RFI. Other than that the board looks like a giant step, and I set a charge out of typing DISPLAY..... can't wait to try the other features, and the arrival of the next TAPR newsletter.

I feel silly itemizing all the transportation, petty cash, entertainment, etc. If it is possible, I would like to only add the pastry bill. I purchased a case of beer and a gallon of wine, but since no-one touched them, I took them back, and that was a little over $30.00. The driving expenses were more my responsibility, because I didn't want to use the mail to send the conference artwork;; as you can see it goes on and on. Next time, we will have more experience at these things. Now on the other hand, if you or packet radio were a large corporation, you would have had a list down to the toothpicks (chuckle). So since amateurs, for the most part, try to help the group as a whole, maybe this is one way that I can help. I will send you a receipt as soon as I can get in touch with the banker. .... and hopefully before Friday.

Have a REAL good day. -cas-

Date: March 20, 1983 1[illegible]-PST
From: Alan Larson <Larson@SRI-KL,A[illegible]A>
To: Hank Magnuski
Subject: New protocols...

Well, TCP/IP and the 'real' job have kept me swamped for some time. I have not even logged in for a while. It looks like progress was made without me on the VADCG repeater program. I think I was about done (as I recall) except for a few questions.

One of the ones that concerned me was order of scan on the call list. It looked like it should be [illegible]' to have the repeater callsign address field actually be a list of repeaters to use. However, there was no indi ation of which order they should be placed. If WA6AZF wants to send to WA6SLF by the path:

WA6AZF -> KA6M/R -> K6VCO/R -> WA6SLF

should the repeater sequence have KA6M/r orK6VCO/r first?

What I had actually wanted to do was put this in the TNC code, so any board could repeat. If the lists were legal this way, I could send Jeff's (WA6SLF) board back to him in Stockton, and perhaps talk to him on packet by a multiple hop link, using boards that were not put up as repeaters. Given the larger number of boards of this type in the field, it seems important to get the code squeezed in.

I had done some bugfixing, and squeezing of routines to make more room for such stuff in a fully equipped board. Very good news is the work that Bill (N6FQR) had done to expand space on the board and add a timer interrupt to it. I think the timer mod would be one I might have to insist on to make the code reasonable to get all the parts in. Then the timer routine that is there (a kludge!) could be removed, and a reasonable scheduler used.

[illegible] to have disappeared into the ether like I did, all I can say is "Wow, TCP/IP can really cause grief on a large system when the vendor just barely gets the release out at the deadline".

Alan

...HELLO....My name is Andy Brown and I have just become interested in packet radio. I am a radio buff as well as a bonified computer addict, so Packet is for me. I plan to go to the computer fair tomorrow (saturday), and I was told that there are some packet seminars at (or near- I'm not quite sure) the fair. Are they intended mostly for people already knowledgeable about packet, or would I have enough to gain that would make it worth my investment??? Can I buy a ticket at the door? How much? If it is too advanced for me, would the lectures at the fair itself be educational?

Thank you. I hope to be back soon (before I go to the fair).

Andy Brown (N6ESS)

P.S. I got your numbers from Rob Taylor Ka6NAN . I am soon to be a member of the explorer post. Also. How can I learn more about usins this system?? tnx agn

Good Mornins Hank,

Just a reminder of what we discussed last evenins. On Saturday you are soins to brins a camera, your cables 10/14 pin, and the VHS tape. I am soins to brins the VTR/VHS, a tripod, and an extension cord. Someone from the SFRC, will look for you, or the ticket in room 403 around 11:00 am. At 6:30 pm, I will meet you at the Holiday Inn to pick up those comins to the dinner. I just spoke to the past president of the SFRC, and he said that the sentleman that was comins to set the ticket was W6BIP and he is supposed to set up a table. Meanwhile, I am soins to try to drop by the fair at openins time, and then come back here and finish typins in Doug Lockhart's CP/M programs. Have a sood day, relax, and enjoy.. You have done a real FB job in puttins the conference tosether on our end. Many Thanks & 73,

Curtis

Hank,

The people from the San Francisco Radio Club called me this afternoon, and would like to set up a card table in room 403. They are going to have a rather "famous", SFRC, member, DX etc., W6BIP, work the table. They will need two tickets, like we talked about at the meeting here. I need to get back to them tonight or early tomorrow morning. I will try to see you tonight at 10:00. Dwight will loan us one of the VHS machines, but is interested in free passage to the fair; thought that I would loan him my pass for tomorrow. I need to know how many pins your tv cameras have, we have adapters, and you will need to bring one of your cameras and a tripod. If the tripod is not available, I might be able to get one of ours, and don't forget the tape. I think that one 6 hour run will do it, but you might want to bring two.
That's it for now.... maybe see you later. -cas-

[blank]

N6ECT CCCCCC
GOT DISCONNECTED SO I WILL START AGAIN;;;;;;;;;;

Test file tx from the DG to me only took 2 1/2 mins. This is
N6ECT LOGGED
GOT DISCONNECTED AGAIN;;;;;

Test file = tx time 2 1/2 mins. WOW!
If Paul's plane should arrive late, he could crash here
for an evening; or if he might need anything, he could call.
All for now, as I have to catch up on some other things. CUL
The fix you made to the watchdog is FB..... cas

To: All Packeteers Attending the WCCF & Networking Conference
From: Hank Magnuski, KA6M, and Paul Rinaldo, W4RI
Date: 15 March, 1983

Subject: Event Log for the Second ARRL Computer Networking Confrence

The Packet Conference and Packet Radio Demonstrations will be in Rooms 401 & 403 on the fourth floor of the Civic Auditorioum. The following events are scheduled for the conference:

03.16 Wed 15:25 Paul Rinaldo arrives at SFO. Welcome Paul!
03.17 Thu 19:00 Packet Radio demonstrations setup, Room 403, Civic Center
22:00 Jet-Leap recovery session, Holiday Inn/CC, Paesanos Lounge
03.18 Fri 09:00 Computer Faire Exhibits and Meetings open
09:00 Packet Radio demonstrations begin in Room 403, Civic Center
16:00 PACSAT Committee Design Review, Room 401, Civic Center *
18:00 PACSAT Committee Design Review ends
18:00 Computer Faire exhibits and Packet demonstrations end
18:30 Transportation available for speakers' dinner guests, H. Inn/CC
19:00 Dinner for speakers and committee members
03.19 Sat 09:00 Computer Faire Exhibits and Meetings open
09:00 Packet Radio demonstrations begin in Room 403, Civic Center
09:00 Second ARRL Computer Networking Conference begins, Room 401 CC
09:00 Openings remarks by Paul Rinaldo & Hank Magnuski
09:15 Speaker: Lyle Johnson - TAPR TNC Features
09:45 Speaker: David Henderson - Design Decisions for the TAPR TNC
10:00 Speaker: Margaret Morrison - TAPR Realtime Low Level Software
10:15 Speaker: Harold Price - Multiuse Design for the TAPR TNC
10:30 Speaker: Dan Morrison - TAPR TNC Audio Filter
10:40 Coffee Break
11:00 Speaker: Terry Fox - AX.25 Level 2 Protocol Design
11:30 Speaker: Hank Magnuski - Address Mechanisms in Level 2 Nets
11:50 Informal Luncheon at Salmagundi's Restaurant
13:15 Speaker: Terry Fox - A Packet Assembler Disassembler
13:30 Speaker: Paul Rinaldo - Packet Adaptive Modem
13:45 Speaker: Den Connors - The PACSAT Project
14:00 Speaker: Phil Karn - PACSAT Modulation & Access Methods
14:35 Speaker: Robert Richardson - A Software Approach to PR
14:55 Speaker: Doug Lockhart - A Block Oriented Interface to CP/M
15:20 Speaker: Robert Forchheimer - Sweden's SOFTNET
15:35 Coffee Break
15:50 Forum: Network Strategies for Packet Radio
18:00 Computer Faire exhibits and Packet demonstrations end
19:00 PACSAT Committee session, Hardware Design, Hol.Inn/CC *
03.20 Sun 09:00 Breakfast at Zim's Restaurant
10:00 Computer Faire Exhibits and Meetings open
10:00 Packet Radio demonstrations begin in Room 403, Civic Center
10:00 ARRL Digital Communications Committee meets, Room 401, CC
12:00 ARRL Digital Communications Committee meeting ends
13:30 Packet Radio Computer Faire Session, Room 401, Civic Center
13:30 Speaker: Paul Rinaldo - "History of Packet Radio"
14:00 Speaker: Hank Magnuski - "National PR Network Standards"
14:30 PACSAT Committee session, Software Design, Room 401, CC *
17:00 Computer Faire exhibits and Packet demonstrations end

* PACSAT Committee meetings are open to any person volunteering to work

The Proceedings will be distributed at the conference.

To: All Packet Stations
From: Hank Magnuski
Date: 14 March 1893
Subject: Successful Beta-Beta Tests

Today I successfully connected a TAPR Beta TNC running Rev. 2 software with a VADCG TNC running the LIPM05/TIPM05 beta test software, utilizing the new national standard protocol.

Testing is not totally complete, but connects and disconnects were initiated from both directions, text was sent in both directions, and no obvious bugs were detected. In addition, the TAPR board successfully acted as a digipeater for packets initiated from the VADCG.

No problems were found in the Tapr Rev. 2 software, and one fix was made to the original VADCG Beta release.

73, Hank

Hank,

I have the poster, (hand-out), ready for the fair, and a few samples of what it looks like in orange and green. It needs to be printed, and in what quantities I am not sure. The most recent statement concerning the fair attendance says 60,000 people to attend. The copies I have were done on a Xerox machine.

Now, should I deliver this to you today, Monday, March 14, or should I wait until Wed. morning and deliver it? Give me a call when you have some spare time. I am also having three poster boards prepared; one for Packet Operation over a Terrestrial v.h.f. repeater, one for Packet Operation over a high-altitude satellite channel,, and one showing a System block diagram - Packet operation over satellite and terrestrial links, which will be ready Tuesday night.

The press packets have been sent to: Channels 2, 4, 5 , 7, 44, the Cable News Network, The S.F. Examiner, Chronicle, and [illegible] Papers, and United Press International. I also have a copy for you.

That's it for now; let me know about the handout poster for the fair. 73

Curtis

Herk,

Could you remind Paul about WESTLINK as next week is the last chance to air it. I believe that all that is required is a phone call. The artwork for the fair handout is currently being worked on and should be finished soon. I will deliver it as soon as it is finished. Do you think that we should send an announcement for the conference via U.S. mail to the PPRS members?

Curtis

To : Hank Magnuski
From: Curtis Spangler
Date: 09 March 1983

Subject: Pro-to-col, or is it a Rose?

Re : Your Message of 08 March 1983 "The Protocol that doesn't,etc"

Hank,

I like AMPRNET.2B, AMNET.2B, and RADNET.2B in that order, I also like the followins:

DARNET.2B
PARNET.2B
PARSNET.2B

Digital Amateur Radio NET Packet Amateur Radio NET
Packet Amateur Radio Satellite NET

Needless to say, out of my list, I like DARNET.2B the , because, well, it is obvious, darn it! (chuckle)

Just Some Input

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	PR Docket No. 83-28
Establishment of a Class of Amateur Operator License Not Requiring a Demonstration of Proficiency in the International Morse Code.	)	

COMMENTS

I am overjoyed to see a proposal for a codeless Amateur Radio Operator's License.

I am a computer programmer, 27 years old, with more than 10 years' experience in computers. Two years ago I became heavily involved with the local Amateur Packet Radio group, headed by Hank Magnuski, KA6M. (The group has since become the Pacific Packet Radio Society.) At that time there were about 30 people in the group. I was excited by the idea and the potential of packet radio and was willing to learn and to help it get going.

I started collecting information and equipment. I subscribed to the newsletters of the Vancouver Area Digital Communications Group and the Hamilton (Ont.) packet radio club, and bought the AMRAD Packet Radio Conference proceedings. I bought a 1200 baud modem and a packet radio "terminal node controller" board. I started reading listings of the software that runs in the controller board. I reviewed a Canadian book (from Tab Press) on packet radio.

At the same time, I was attending Packet Radio meetings and meeting many of the hams involved. I discovered that, to connect a radio to my computer and send 1200-baud ASCII computer data over the air, I was required to deal with a Federal agency and to learn an archaic transmission code well enough to decode it in my head "on the fly". I began to see why packet radio was still holding meetings and not building a network.

I'm not sure how familiar you are with the history of the computer industry. I am not the person to teach it, but one thing has been clear to me: Much technological progress has occurred because anyone could attempt to design and build an improved anything -- hardware, software, communications network, mass storage device, you name it -- and it was NOT controlled

by the Government, choked by bureacracy, or shielded by special interest rules and legislation. If I liked ASCII better than EBCDIC for my application, there was nobody who could force me to use EBCDIC. If I found a way to store twice as many bits on a disk, or push twice as many down a local area network cable, the marketplace and my organizational ability would decide whether my invention was worth its salt.

I began to learn about Amateur Radio from the hams around me. Here is what I learned:

* Whether or not I ever USE Morse code, I need to learn it to pass this test. Being able to write a program that can read it off the air and translate to ASCII on my screen is not good enough. The idiot work must be done by a human to be worthwhile.

* If I don't go get a license, but just set up a radio and a modem and start transmitting, I am committing a Federal crime, and there are plenty of old hams who do nothing but sit in their homes and listen for people like me so they can turn me in to the Feds. This is true whether or not I cause any harm or interference to anyone else.

* It's theoretically possible to run our packet radios faster than 1200 baud -- in fact by using telephone style modems we are using a lot more bandwidth than we need -- but it would take a special variance from the FCC even to experiment with it, and there's no guarantee that it would ever be legal for the general public anyway.

* Yes, I could hook up a packet radio to my Computer Bulletin Board System (which had been running for about a year, accepting public telephone calls on my Apple computer to allow people to send and receive messages with each other) and let people send and receive messages over the radio, but there are laws that require me to be there at all times so I can cut them off if they swear or something. (I need a "control operator".) Furthermore, I can't pass "third party traffic" and if someone might use my system instead of making a toll phone call then I am illegally using amateur radio to steal business from the phone company.

* I have some good ideas, but why don't I go get a license and then I'll really have something to say. My opinion is not worth much because my name doesn't have random letters and numbers after it. (This was not true of everyone but was definitely there in some.)

This was daunting, but I still had enough excitement and energy to continue working. (Partly, I couldn't believe things were really that bad. If I built a packet radio station and got it working and providing a useful service to the Amateur community, nobody would really play straight-and-narrow with the rules, would they?) I bought parts for my Terminal Node Controller board and started to build and debug it -- buying and borrowing

tools and equipment, setting up a room in my house for electronics work. I got a copy of the FCC Working Paper on deregulation of Amateur Radio and prayed and tried to get people to read it. I enrolled in the San Francisco Radio Club's class for novices and started to learn radio theory (easy), regulations (rote memorization), and Morse code. I kept going to Packet Radio meetings and eventually ended up on the Steering Committee -- it turned out that since many of the hams there had little computer experience, they'd never been exposed to networking concepts, ideas, or implementations. As a result I was one of the three or four people in the club who could actually UNDERSTAND the protocol being used and the program that implemented it. "They also serve who stand and rag-chew", I guess, but they weren't helping to design the network, which I was.

Alas, my Morse Code classes weren't going very well. They were trying to teach at 15-18 words a minute, so we'd eventually be comfortable at 13 words a minute. It was an effort, and I wasn't interested; I was interested in getting past the regulations so I could start to get some real work done. The radio theory was going fine and there was interesting information there, things that I would need to know. But after a month of two-night-a-week classes, I dropped out. We hadn't even been taught all the letters yet!

I tried to stir up some sentiment in the Packet Radio Society that we should work towards a code-free license, by passing a resolution and sending it to the FCC, ham magazines, etc. The general feeling was that I should get a license first and then they'd think about it.

I tried to find out why people felt so strongly about Morse code. Most of them admitted that they never used it themselves except for I.D.; they all used voice and packet. So what was the fuss? Here were some answers I got. Some were used as arguments, some were told in private by friends, some were figured out by me:

* We had to do it, so you will too. No punk kid is going to get away with getting in easy when I had to pay my dues.

* If we removed the code test, the airwaves would be flooded with trash. It would be just like CB. We've got to hold on to the spctrum space and not let it get crowded or it won't be any good anymore.

* It's not such a big deal, it only took me a week, so what are you so worried about?

* That's the way it is and you'll understand after you've been in this field as long as I have.

* It's useful in emergencies, you might hear an SOS that nobody else hears and save a life.

* You could transmit using nothing but a rusty spoon and a piece of rock when the earthquake happens and your packet radio is smashed.

* It can get thru many kinds of interference that voice and computer data just can't penetrate.

Some of these need no rebuttal, but others might:

* The airwaves belong to "the public". Hams seem to feel that the airwaves belong to hams -- that it's fine for them to carry around a handy-talky and talk to their friends all day on the repeaters, but for the general public to do that would spoil their game. They aren't advancing the state of the art of radio -- why do they get privileged use of the airwaves?

* If the communications modes in use now are too crowded, the solution is not to create a privileged class -- the solution is to use new modes, such as packet rather than Morse, which allow more people to share the same channels that are now crowded.

* Maybe with the right teacher it IS possible to learn the code in a week. I didn't get that teacher. Mine tried to teach me far more than I wanted to know or needed to know. As a result, I never learned it -- should that be a reason to keep me from advancing the state of the art of radio networking?

* Cardio-Pulmonary Resuscitation and first aid are useful in emergencies too, but not knowing them doesn't keep you from getting a ham radio license. The government can encourage emergency preparedness but to mandate it just means that people who would contribute in other ways won't contribute at all.

* After the earthquake there will be several thousand voice handy-talkies around, as well as good old CB radios. Civilization is not going to disappear from the Earth without killing all the humans too, so building radios from natural raw materials is not going to be a problem.

* Packet radio gear automatically detects garbled transmissions and will retry them without my even noticing most of the time. If packet won't get thru and it's really important, of course, I'll use the telphone. I can always use a program to transmit and receive in Morse when conditions are bad and the phones are down, if I ever need to -- the same way I'd use a program to talk packets (much faster) under normal conditions.

Meanwhile, back in the hardware lab, the circuit board I was building was giving me problems. I'd tried to replace the memory section with one that only required 5 volts instead of 5, 12, and -5, and had a power supply that was too small for the board. I had managed to burn out 3 or 4 central processor chips and possibly some of the auxiliary chips while debugging. The board worked once in someone else's system but I never got it to

work by itself.

Between the lack of support on the code&license question, and the hardware problems, my active interest in packet radio started to dwindle. I kept attending meetings and talking with Hank (KA6M) on the protocol, but eventually sold the circuit board to someone who could debug it, returned the borrowed scope, disassembled the wire-wrapped PROM burner, and went back to working on software. To this day I haven't made an active contribution to the technical art of packet radio -- I've critiqued several designs and offerred suggestions, but I never got the chance to work on the software or hardware to actually implement the designs.

That's where the crying need is now. There are plenty of people who know how to build a radio, put up an antenna, organize a ham society. There are only two people in our group (of about 40, still) who have worked on the software, though -- and they aren't likely to get new recruits who aren't already hams. For someone coming from the free-and-easy world of computers, coping with the attitudes of hams and the bureacracy that governs their behaviour is a serious problem. We and the other packet radio groups would like to build a nationwide network of store-and-forward packet radio repeaters. This requires a lot of work -- much of it organizational, some of it in hardware, and a lot in software.

That's where I can make my contribution -- except there's a whale in the way. You, the FCC, are that whale. When I gave up, I resolved to just sit back and wait until the ham radio situation straightened itself out (if ever) before attempting again to contribute. The current proposal (for a code-free license) is a step in the right direction. If you implement it, I will get a license (although that alone will probably take six months of paper-shuffling) and get some more hardware and go back to trying to do some good for the packet radio world. If not, I'll sit waiting in the wings until some of the old (and young) reactionary hams die off and maybe there is some acceptance of new ideas.

My ultimate fantasy is to see black boxes with an RS232 (serial computer data connector) plug on one end and an antenna on the other. Anyone could walk into their favorite computer store, Radio Shack, or ham store, and buy one, plug it into their home computer, and be interconnected with the other packet radio users in their city (and thru their city's connection to the packet radio backbone network and packet radio amateur satellites, to all other packet radio sites in the world).

Right now, due to earlier FCC deregulation efforts, that kind of networking is possible with a 300-baud direct-connect telephone modem -- and thousands of people have bought and used them for exactly that (such as with my Apple Bulletin Board System). Curiously enough, visitors from other countries express the same incomprehension at seeing this that hams express at the idea of people just buying a packet radio and turning it on.

The problems with telephone modems are that they are slow and only provide local communication -- nobody can afford to use one for long-distance communication unless they can write it off as a business expense.

Imagine what would occur if you could buy an Atari or Apple or IBM home computer with a communications box -- one that didn't cost $20/hr on the telephone, but still put you in touch with the world. I've been using computer networks for close to 10 years and I have some idea of the amount of information that would be available -- that would make peoples lives and jobs easier -- that would provide conversation and company to people who are feeling alienated -- that would provide a forum for people upset or enraged or interested in a public discussion -- that would bring the Information Age into the homes of the people, not for the benefit of a corporation, not with a monopoly deciding what information would get into the network and who would get it out, but for the benefit of all the people helping each other to build their dreams, share their knowledge and their energies and their pleasures, and live their lives a little closer to the way they want them.

There are people attempting to build the first hardware toward this vision -- the Tucson Amateur Packet Radio Society. (Their box does not include the radio; you have to add a handy-talky.) There are people, of whom I am one, working on and using networking software that connects over four hundred diverse computers around the world into an anarchistic computerized forum -- controlled by no-one, participated in by all. (All messages are transferred over phone lines, and any long-distance calls are paid for by business and University computer budgets.) This network is called the Usenet and much of its software is in the public domain. I and others from the computer field can adapt this, and other, software, and contribute the knowledge of networking required to make it work. There are people who have been trying to design "WorldNet" for years now -- figuring out the software and administrative requirements for a network that anyone could connect to or disconnect from at will, a network that could handle a million or 100 million users, in their usual state of motion and change, without falling apart. We're professionals who realize the potentials and are afraid that, as in the past, most of the benefits of computer technology will continue to go to businesses and governments, operating to restrain peoples' choices instead of expanding them, giving the public pay-TV, video games, and central control over information distribution, instead of an improved society.

But WorldNet is still a fantasy. Some of the problem is economics -- technology is taking care of that. Most of the rest of the problem is governments. Within the U.S., that means the FCC. Even with a code-free license, a license is still required, classes have to be taken, there's an N-month delay while the bureacracy shuffles your papers. To many people, it's just not worth hassling with -- there are so many other interesting things that they could be doing with their computers

-- they'll find another interest. One where they can walk in, buy it, and use it, without asking the government. And those places are where the products will be introduced, where the technical advances and the price reductions will be made, where the public will be served. Not in packet radio or WorldNet. Not unless the regulations get as loose as CB, or looser.

I realize that it takes time to dismantle a legacy of bureacracy, and I've been encouraged in recent years to believe that is the job the FCC has undertaken to do. The code-free license is an important step on that path, and no matter how much it angers the existing special-interest-group (many Amateur Radio Operators), it will be for the ultimate good of the country and will contribute to the world's progress both in the radio art and in the improvement of the general quality of life.

I believe that removing the current Morse code requirement from the Technician Class license is the best way to introduce the code-free license into the existing licensing structure. It significantly reduces the administrative burden on the FCC without significantly altering the requirements of the license or the privileges granted by it, in comparison with the proposed Experimenter Class. It also imposes no new burden on the ARRL volunteer licensing program (except larger volumes of people taking the existing tests, which the ARRL can hardly object to).

I furthermore believe that the frequencies and transmission modes authorized for the codeless license should be the same as those of the current Technician's and General licenses (subject to restrictions imposed by international agreements). I believe that, in general, the introduction of new communications methods into the Amateur service will be hastened by as few restrictions and regulations as possible; a competent Technician should not be required to upgrade her or his license to use a frequency band or a transmission mode which was previously unused for similar methods. In other words, as many possiblilties should be legalized at once as is possible, to avoid later having to spend time removing restrictions, and to avoid discouraging good new ideas because a long-drawn regulatory process is required to experiment with them. I realize that some areas must be reserved for Advanced and Extra classes as an incentive measure, but this should not be applied such that the set of available frequencies for experimental Technican and General use is too small.

In particular, almost all current Packet Radio work is going on in the 2-meter bands, because equipment is cheap and plentiful. If the 2-meter band was not available, packet development work would have to move to 220 or 440MHz where equipment is costlier. This would also split the existing packet radio groups between old-timers who could continue to use 2 meters, and newcomers who'd be forced into other bands.

I note that the ARRL's editorial against this proposal (March 1983 QST, page 9) never once mentions an argument against the proposal; it simply states that most amateurs oppose it, and

rages against the FCC's refusal to obey the ARRL in this important matter. Personally, I'm on your side.

I have enclosed a few comments that were exchanged on the Usenet (the computer network mentioned above) on the subject of code-free licenses. I have also put these comments into the Usenet, and encouraged others to send their own. A few sentences will clear up some terminology problems: Phrases like "decwrl!decvax!harpo!floyd!peri!sbcs!rick" identify the path that the message has taken thru the network, from Rick on machine "sbcs" (SUNY Stony Brook computer science dept.), thru machine "peri", to "floyd", and so on to "decwrl" (Digital Equipment Corp's Western Research Lab). A "flame" is a heated reply; e.g. a response made while annoyed, rather than after deliberation. The enclosed are only a few of the comments that were made on the topic; I started to save them but quickly realized that there were far too many messages to save, so these are only the first few. The last message was sent by me in response to a general "Hey, has anybody used packet radio out there?" query.

Respectfully submitted
7 March 1983

John C. Gilmore
Sun Microsystems, Inc.
2550 Garcia Ave.
Mt. View, CA 95051
(415) 960-1300 x309

CC: Usenet newsgroup net.ham-radio
Hank Magnuski, KA6M
Curtis Spangler, N6ECT
Vic Clark, W4KFC
Paul Rinaldo, W4RI

From decwrl!decvax!harpo!floyd!peri!sbcs!rick Thu Nov 18 14:50:56 1982
Subject: No code license
Newsgroups: net.ham-radio

No doubt that this article should be addressed to net.flame, however, I think most of the non-ham net subscribers are not interested in dits, dahs, and morse code blahs.

(flame on)

The ARRL ruling class (QST, Nov 1982, pg 9) claims the no code license is "an idea whose time has not come." They base this assertion on the following arguments:

1. The code requirement is the only proven screening device for obtaining competent amateur radio operators. Apparently, they believe only individuals of the HIGHEST technical and moral fiber are able to pass the code exam. Rubbish!! We have more appliance operators, lids, and people who could not cut a dipole antenna today than ever before. I have many technically competent friends (CS types, EE's, etc) that are capable of passing a code exam, but they would rather spend their time updating their state of the art skills. These same people would be very interested in experimenting with spread spectrum, packet radio, repeaters, etc, and have great potential to help advance the amateur state of the art.

2. Amateurs have lost confidence in written exams. We can restore their confidence by making the exams more difficult. The content of the exams is very easy to protect: merely compose each individual exam from a data base of several thousand questions, and change values in questions which require a numerical answer. Say goodbye to Dick Bash and his short cut books. I understand that the FCC has taken some steps in this direction.

3. Difficulty in self-policing the bands filled with new, and presumably inexperienced or incompetent amateurs. There is no easy solution to this problem; it always has, and always will exist. This attitude akin to arguing against having children because they are too difficult to raise. Also, while more amateurs may mean more potential problems, it also means more amateurs to help in policing the bands.

4. (Non ARRL attitude) Alan M(orse) Amateur: "I passed my 13 wpm code test, so everyone else must." My only comment is that hazing belongs in high school or college.

Some questions I have for the ARRL are what makes a good ham (honey sauce and a little pineapple on top?), and exactly what type of people do they feel we need to attract? Should amateur radio be more than a alternate medium to the telephone for the masses to communicate over?

What makes radio amateurs more equal than their fellow citizens when it comes to using the "public airwaves"? Why not use morse code only as a computer communications protocol? In what direction does the ARRL perceive amateur radio should head? Should the ARRL make decisions which contradict popular opinion, for the greater good of Amateur Radio? (Depending on who you listen to, hams are for/against the no code requirement. The ARRL believes it is espousing a majority opinion in coming down against the no code license).

The focus of this entire article is that if we can attract some new technical blood into the amateur service, there are many contributions that can be made to the state of the art. Packet Radio, for example, has not been thoroughly explored by industry; can amateurs invent new routing strategies to deal with selective fading, mobile stations, or networks which can dynamically rearrange themselves to bypass failed nodes, etc.. (Sure, I know a lot has been written, but how many of these schemes are more than ink on a piece paper?) What about using more efficient modulation schemes for packet than NRZ, or FM -- anyone for delay modulation, m-ary PSK, etc? Given the right people, there is much trail blazing to do.. I feel that dropping the code exam in favor of a tough written exam will bring more technical types into amateur radio, and, as a result, the entire amateur service will benefit.

A little note on my background (ammunition for those who will argue for the code requirement): I was able to learn code well enough to receive 18 wpm in about 1.5 months, all while working full time. I passed my advanced class license on the first try. I have operated CW and ENJOYED it (I also have operated RTTY - yet I do not ask that everyone be familiar with this mode as a prerequisite to obtaining a license). Although I frequently disagree with ARRL policy, I am a full member. As for the technical/professional end of things, I am a degreed digital design engineer working with a university research group in the computer networking/distributed processing area.

(flame off)

(return flames encouraged -- send to net.ham-radio).

_.. .

Rick Spanbauer, WB2CFV
SUNY @ Stony Brook

allegra!sbcs!rick or
peri!sbcs!rick

From decwrl!decvax!harpo!eagle!karn Thu Nov 18 22:47:01 1982
Subject: Re: No code license
Newsgroups: net.ham-radio

I thoroughly agree with the article in favor of the no code license.

I have been licensed about 11 years, 9.5 as an Extra. I do enjoy using CW on the HF bands, even though I was one of those who said "I just want to be able to talk" before I got my first license. However, I feel that state-of-the-art technical capability is FAR more important (and far more lacking, unfortunately) than Morse Code capability in the Amateur service, and that knowledge of CW is often irrelevant to many of these technical areas.

I have often asked technical friends who are interested in the practical aspects of communications why they don't get an amateur license. The replies are usually along these lines:

1. "I don't want to learn the code; I just want to experiment with [packet|satellites|microwave|etc]."
2. "Why should I want to be part of a service that still uses Morse Code?"
3. "Nobody does anything technically innovative in the Amateur Service."

When you think about it, these three reasons are circular. Opportunities for major technical innovations are missed because many technical types aren't hams. Many technical types don't become hams because they don't feel learning CW is worthwhile. CW is still used because there haven't been technical innovations (and the acceptance by the amateur community) to replace it.

The surest way to break this cycle is to introduce new blood by removing the CW requirement. I'm not sure that making the written test harder is the right thing to do; the purpose of the test should be to make sure that the operator has the technical expertise and understanding of the rules to operate his station safely and prevent interference to others. The FCC has also shown that it is incapable of producing tests that are truly relevant, up to date and a good measure of an operator's technical expertise.

The biggest threat to our amateur allocations come from competing interests who point out the underutilization in our higher bands. The surest way to protect these bands is to use them, and the best way to use them is to bring in new amateurs who will use them.

Phil Karn, KA9Q/2

From decwrl!decvax!ittvax!tpdcvax!bobvan Fri Nov 19 22:54:35 1982
Subject: Re: no code license
Newsgroups: net.ham-radio

Phil Karn's recent "no code license" article really hit home with me.

My dad is a ham. I've got a first class radiotelephone license. I've got the money to buy a rig. I'd love to experiment with SSTV, packet radio, AMSAT, and new modulation techniques. I've even got a program for my micro that will teach me the code! But I don't have my ticket.

I've spent a lot of time at hamfests and listening on the bands and am quite certain that I am more competent technically (rf, audio, digital) than a good percentage of the hams on the air today. I understand why the rules are the way they are, but wish there was a way I could get a license without having to learn the code.

For me, learning Morse code has always been a hill that I lacked the momentum to climb. I even sat down (with the program) and learned all the letters once. There has always been something more interesting (and easier) that led me away (CS, EE, relationships, not in that order).

Are there any other technically competent but ticket-less net.ham-radio readers out there? Send mail to me and I'll summarize the repiles.

Bob Van Valzah
(...!decvax!ittvax!tpdcvax!bobvan)

From decwrl!decvax!harpo!eagle!karn Sat Nov 20 12:45:02 1982
Subject: Code Free License proposal
Newsgroups: net.ham-radio

Remember, the FCC has already directed its staff to draw up a Notice of Proposed Rulemaking (NPRM) for a code-free amateur radio license in the USA. When the NPRM comes out, the FCC will of course be soliciting comments from interested parties.

The ARRL has come out against the code-free license, as it has many times in the past, claiming that it represents the majority of its members. Amateurs are certainly not unanimous however; the editorial staff of Ham Radio magazine recently wrote an eloquent argument in favor of the license.

I suggest that the opportunity for the code-free license has never been better than it will be later this year. Since there seem to be so many of you out there who wish to become hams, I suggest STRONGLY that you prepare your comments and send them to the FCC at the appropriate time. Believe it or not, the FCC really does read and consider the written comments it receives. Fewer comments are received than you'd expect, so that those who do take the effort are rewarded for their time.

It will be tough to overcome the ARRL's opposition to this issue, but not impossible. The mere fact that the Commission made the directive to its staff indicates a strong positive predisposition. If you want a code-free license, write and say so! Also, post a copy of your final draft to the net.

Phil Karn, KA9Q/2

From decwrl!decvax!ittvax!tpdcvax!baker Mon Nov 22 10:18:58 1982
Subject: no code license
Newsgroups: net.ham-radio

having been a ham for 23 years i have some observations about no code licenses. when i became a novice the big challenge was the code at 5 wpm and ohms law. i over came both of them and felt that i had to work for it and now that i have it i want to protect it from those who would destroy it.

The sad state of affairs on the hf bands (lids, kids, space cadets and phonetic fanatics) with all the jamming, swearing, etc. drove me to uhf weak signal work and oscar. up here we have those 'technicians' who all they know is the code at 5 wpm. well of course noboby cares because all license classes operate in harmony.

what is the major mode for weak signal work? cw of course. the majority of eme qso's are cw, the majority of low enhancement dx qso's are cw. what does it prove? even in the highly technical world of uhf, cw is very important.

you can have your no code license up here, but please don't stomp on my 'in the noise almost readable' signal because i am also trying to advance the communications art.

the biggest problem will be in the test the fcc gives. if it is too difficult all the non ee types will be claiming discrimination. if it is too easy another cb band will result. just maybe a 5 wpm cw test will be perfect way to separate the men from the boys.

73 and good dx
dan af9r
(....decvax!ittvax!tpdcvax!baker)

From: sun!gnu (John Gilmore) Tue Nov 16 00:03 1982
Subject: Packet Radio
Newsgroups: net.news

I owned a VADCG (Vancouver Area Digital Communications Group) TNC (Terminal Node Controller) board last year, but sold it after burning out three 8085's, an 8273, etc; i.e. when it was obvious that it would require someone with more hardware background to get it working. But packet radio *is* active in the SF Bay Area; we have a well-positioned repeater and a few regulars on the air as well as 20 or 30 occasional drop-ins. Once TAPR (Tucson Area Packet Radio) has all the bugs out of their new TNC board and is mass-producing them (assembled and tested, thank you), it'll be much easier to get on the air, requiring just the TNC, 5 volts, a handy-talkie, and a terminal or micro.

FLAME ON: The other half of the reason I dropped out of packet was that it was totally misoriented away from a computernik like myself. Every time I turned around, I was contemplating breaking the law by doing something obvious like connecting the packet radio to a micro Bulletin Board System which would relay traffic to and from dial-in telephone users. Being from the wide world where nobody steps in to say, "You can't plug this plug into that jack", this was simply ridiculous, but I was repeatedly warned that there were many, many old-timers who'd be pleased to turn in innovative networkers to the feds. I want to build an anarchistic ham Usenet; current ham radio rules are more like the Arpanet except that on radio there are people who really care if the rules are broken, who like to see people be fined, have their licenses taken away, and/or be jailed.

This plus the requirement that to squirt computer data from SF to Mountain View I had to learn and then forget Morse Code, was enough to get me out. A shame, since I was one of the two people in SF packet who really understood the protocol. I wish I could be vindictive about it, but I'm just sad, because this kind of attitude will just delay a truly useful packet service (yes, one that will compete with old-timers for band space, and which will in the process serve a LOT more fellow citizens, joint owners of the airwaves, than DX contests ever will).

My current plans are to wait a few years to see if the laws and/or the old timers ever grow up and/or die off.

Note that most of the current leaders in ham packet are NOT anti-innovation or anti-computer; but they feel they just can't buck the tide and still get anywhere with the ARRL and FCC.

FLAME OFF. If you already have the license (Tech class), and you're willing to put up with petitioning the FCC whenever you want to change your baud rate, packet can be a great thing. If it is ever deregulated, a cheap homegrown microcomputer network will spring up in a hurry. Until then, it's not for the average netnews reader.

I don't have my packet files here with me; if you want explicit pointers to current literature, mail to me to remind me, and I'll mail or post some.

John Gilmore, Sun Microsystems

To: All Packeteers
From: Hank Magnuski
Date: 08 March 1983
Subject: The Protocol that doesn't have a Name

We adopted a new standard last October, and unfortunately we failed to give our new baby a name. It has been variously referred to by the followins titles, none of which are satisfactory:

1. AX.25 -- This name does not fit very well for people who have no intention of implementins AX.25 Level 3.

2. LAPB -- The call sisn addresses and other stuff violate official X.25 LAPB.

3. TAPR/AMSAT Protocol -- Should really be TAPR/AMRAD/PPRS/SLAPR/LAPR/etc./AMSA Protocol considerins all the input we sot from various sroups in doins the desisn.

4. AMICON Protocol -- Doesn't make sense for LAN only use.

5. HDLC Balanced Class with options 2, 4, 7, 8 & 11 plus Special Extended Addressins -- That's kindof a mouthful.

6. Etc.

I sussest we need a very specific name to refer to this beast. The name should reflect our radio orientation, and we must realize that this protocol is just the first of a family tree hierarchy of protocols.

So, I'm thinkins of somethins like

AMICON.2B or AMPRNET.2B or AMNET.2B or RADNET.2B

where

AMICON etc. is the seneric name for amateur radio netwo
2 is the ISO Level Number applyins to the protocol
B is the revision or spec number. B applies here because 'A' should apply to the orisinal VADCG protocol and 'B' fits nicely with LAPB, which this thins resembles.

Comments?

73, Hank

TO: HM
FROM: LJ
SENT: 07 MAR 83 18:52:02
READ: 07 MAR 83 23:12:20

Hank,

Please take a look at the followins. It is a trace dump of rackets exchansed between two TAPR TNCs runnins in the NEW AX.25 mode. Please confirm that the location and contents of the SSID and PID byte are correct. The first column is the data in HEX, the second is the ascii value with each byte shifted risht one bit. The third is the ascii value with the byte as is. The bytes are show as they sit in memory, not as they are transmitted i.e., the MSB is on the left.

Although we don't have a dump here, Disipeated frames have the flas byte in the same location with a value (SSID=0) of E1 in the last call sisn field, all other flas bytes are 60.

Be advised that we do make use of the REJ frame. Hopefully your software will just isnore it and eventually time out rather than disconnect.

Once you asree that the protocols are now compatable TAPR can make proms and start sendins out the TNCs to the SF area.

Hope to hear from you soon, 73,
Harold.

```
frame read
00-96AC6E88 4040604E 826E92B2 8E6A12F        KV7D  0WA7IYG0:     ..n.@@'..n...a/
frame sent
00-AE826E92 B28E6096 AC6E9840 406163         WA7IYG0KV7D  01       ..n. .`..n.@@ac
*** CONNECTED to WA7IYG
frame read
00-96AC6E88 4040604E 826E92B2 8E6100F0       KV7D  0WA7IYG0.x    ..n.@@`..n...a..
10-68656C6C 6F0D                             42667:               hello.
frame sent
00-AE826E92 B28E6096 AC6E9840 406121         WA7IYG0KV7D  0.      ..n..`..n.@@a!
frame read
00-96AC6E88 4040604E 826E92B2 8E6143         KV7D  0WA7IYG0:     ..n.@@`..n...aC
frame sent
00-AE826E92 B28E6096 AC6E9840 406163         WA7IYG0KV7D  01      ..n...`..n.@@ac
***disconnected
```

TO: HM
FROM: DC
SENT: 07 MAR 83 17:18:03
RECVD: 07 MAR 83 16:24:38

To: All PACSAT Volunteers
attending the San Fransisco Computer Networking Conference
From: KD2S
Re: Meetings

The following meetings are planned for the weekend of March 19th, after having spoken to most of the principals involved.

Friday nite (at banquet and after) - general design review and address reports of individual groups

Sat nite - System Control Unit design review, RAMUNIT design meeting, communications co-processors design.

Sun afternoon - hardware-software group meeting to map out interface specifications.

PLEASE NOTE: There are several people who have not yet communicated to me that they will be able to attend the meetings. There is travel money available, and I need to know who will be there as soon as possible to help schedule and coordinate activities!

Thanks, Den

TO: HM
FROM: DC
SENT: 07 MAR 83 14:36:49
READ: 07 MAR 83 16:25:08

The PACSAT Project

Dan Connors
PACSAT Project Manager
Radio Amateur Satellite Corporation - AMSAT

AMSAT has begun the design and development of a new form of Amateur Satellite. The PACSAT series of satellite systems has as a design goal total global access by all hams to a store-and-forward packet radio message handler.

Introduction

AMSAT is proposing the design and prototyping of a satellite-based experiment for advanced digital packet satellite communications experiments. This system, called PACSAT, will use internationally-allocated Amateur Radio Service frequencies. The PACSAT system will connect a grid of ground-based amateur radio local area networks in the United States and many other countries via a common store-and-forward packet repeater operating in the Amateur Satellite Service.

This paper details the reasons behind such a satellite. Following the design concepts, a description of the entire system is given, and a list of technical parameters for each of the defined subsystems is shown. The current outline of tasks and scheduling follows, with a description of the efforts of groups already engaged in the initial design effort.

The PACSAT Concept

The Amateur Radio communities in the United States and other countries are currently experimenting with digital networks on radio channels. These networks are using techniques already in place on the national telecommunication networks known collectively as packet networking.

Packet radio systems have a set of benefits unusual in present amateur radio systems. Large numbers of stations may share a common frequency, and use multiple access packet techniques to multiplex several sets of users in the time domain; very high spectrum

utilization is accomplished by keeping all of these users on the same channel. A second benefit of the single shared channel is the ability to find all other users of the packet radio system. No searching of a wide band of frequencies is required; connectivity is maximized. The need of multiple access techniques to detect successful transmissions yields a third benefit, that of reliable transmissions. Any message that arrives at destination has had its data integrity checked. This inherent reliability may well open a series of possibilities for improving emergency traffic handling, one of amateur radio's most important aspects.

As experiments continue on ground-based packet radio local area networks, a new class of satellite is being considered to handle linking of both individual ground stations and local area networks. The PACket radio SATellite (PACSAT) system is designed to provide a store-and-forward digital repeater which is available to all groups around the world for fully global network coverage. The satellite provides this coverage by occupying a low-earth orbit (LEO), which has several benefits. The close proximity of passage, relative to geo-synchronous satellite, allows easy access, with good "link margins". There are thousands of amateur radio earth stations that are already configured to operate on this class of satellite. Additionally, proper choice of orbital parameters allows a sun-synchronous orbit, where passage of the satellite occurs at the same times each day, providing an easy means of scheduling transmissions. This orbit then provides both 100% global coverage and very fair access, and creates a powerful new use of a well-known class of amateur satellite.

There are several purposes for providing such a system in the Amateur Satellite Service. PACSAT will provide a wide-availability vehicle for advanced experimentation, and a prototype system for a new class of satellite service involving reliable transmission of data to remote sites and isolated users, regardless of location. Several internationally-based organizations have expressed interest in just such capabilitiies, and this gives AMSAT the opportunity of spear-heading a potentially major new push in low-cost satellite systems, much in consonance with the F.C.C. charter for the Amateur Radio Service as a "proving-grounds" for new technology. The Volunteers in Technical Assistance (VITA), a non-profit firm dedicated to advancing the level of technilogical expertise of less-developed countries, is actively pursuing the coordination of such vanguard activities, and is working

directly with AMSAT on the PACSAT development.

Other benefits result from the use of digital techniques. Considerable improvements may be made to emergency communications, as reliable, high availability links compatible with global mobile and portable radio service requirements are provided. Additionally, a spin-off benefit for AMSAT itself is the attracting of the new, computer-aware members of the Amateur community into the Amateur Satellite Service.

A possible third set of benefits may be spun off the PACSAT system indirectly; the opportunity exists for designing new types of low-cost satellite launching and propulsion systems as a part of this next generation of Amateur spacecraft.

Such a system would provide a number of functions. In addition to the primary use as a world-wide store-and-forward link, or "flying mailbox", the PACSAT experiment could provide real-time regional linking (standard LEO amateur mode). As mentioned, both local network concentrators (gateways) and individual users could access the satellite. Finally, the system would provide the mechanism for advanced testing of network systems concepts, hardware, software and protocols to be used by packet radio networks in the future.

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PACSAT System Description

PACSAT is an extraordinarily complicated system, rather similar in complexity to the Phase III spacecrafts. In addition to all of the required satellite support subsystems on board the spacecraft, there are two experimental packages, each consisting of multiple uplink channels, common downlink channels, and modems, coder/decoder link-access devices and control microprocessors with interfaces to a common satellite message processing unit (system control unit, or SCU). As if that isn't bad enough, the rigid packet environment demands structured ground stations with all of the familiar hardware (less the directional antennas, as we shall see), and perhaps several microprocessors for handling both the data stream and the automatic station control functions. The use of the microprocessor is upon Amateur Radio.

To ease the burden of trying to understand the whole system, PACSAT can be broken up into subsections, each with well-defined interfaces to other sections. A description of each section or interface follows. Please note that, although the conceptual design has been finished, many design groups are hard at work coming up with the specifications for their parts of the overall system, so that nothing below can be consrued to be the "final word".

Spacecraft

As mentioned, the orbit of PACSAT would be sun-synchronous, that is, appearing at the same time each day. UoSAT/OSCAR 9 has this type of orbit, and displays this property. Additionally, such an orbit guarantees at least two passes per day will be seen by ALL corners of the Earth.

The PACSAT satellite system may be broken into the spacecraft itself, and the experimental packages. The interfaces are defined to be spacecraft/ experiment and spacecraft/ground station.

Two options are available for placing PACSAT experiments into space. The possibility of riding the packages inside of a spacecraft built primarily for other purposes exists, and allows the PACSAT design team to avoid the additional complexity of designing and building all of the required subsystems. AMSAT has looked in particular at the future launch opportunities available on the Conestoga-series of launch vehicles to be provided as a commercial venture by Space Systems of America, Incorporated. SSI will be launching payloads directly into low-earth orbit, providing a mechanism for direct injection

of PACSAT into its final orbit without requiring on-board propulsion systems in the satellite.

A second opportunity is more in line with AMSAT's traditional method of designing the satellite "from the ground up", and will likely provide many more opportunities for future launches. The Space Transportation System (Space Shuttle) has the option of carrying into space sets of three "Get-Away Special" canisters, or GAS cans. Although these cans have traditionally been reserved for inexpensive access for experimenters who did not require throwing their experiments into space, recent discussions with NASA have shown promise for using such a can as a launch opportunity. A satellite would be placed inside the can, with a mechanism in place to allow the Shuttle crew to remotely open the lid and push the spacecraft into the void (hopefully after opening the Shuttle bay doors).

This new opportunity has two tremendously useful aspects: GAS can opportunities are CHEAP ($10,000) and potentially plentiful. The drawbacks are the requirements of building such spacecraft as would be required to fit into the can, and providing a propulsion mechanism for altering the very low orbit into which the Shuttle would place the unit, so that a final, more stable orbit would be available. As it happens, there are active international AMSAT groups that are very excited with the possibility of providing both spacecraft and propulsion.

The University of Surrey spacecraft design team (UoSAT) has expressed an interest in continuing their advanced low-cost spacecraft design and construction projects, and view PACSAT as an excellent opportunity for using their integration expertise, and for providing a vehicle to carry other experiments of interest to their group.

The AMSAT/DL team at the University at Marburg, West Germany, has been discussing the possibility of providing an innovative spacecraft engine which would be ideal for such a craft as PACSAT - a steam engine, not unlike those first designed by Hero in ancient Greece. The mechanism for generating steam in space is not difficult, and impinging sunlight on external water tanks could provide a large part of the energy required to heat the water. Heating coils electrically powered in the area of the super-heated steam nozzles would finish the heating job. Although this concept seems a little far-fetched at first, calculations prove the amount of water required to alter the orbit of PACSAT is quite modest. Further, the ever-present problem of safety to the Shuttle crew is very much reduced by having spacecraft with extremely non-volatile fuels such

as water! Gradual pushes from the steam nozzles at opposites sides of the orbit will nudge PACSAT into its final orbit, and residual water could be used to further occasionally alter the orbit to keep it in a sun-synchronous plane.

PACSAT Communications Experiment Package

Each of two packages will contain a set of uplink and downlink channels with associated analog and digital hardware. Current designs are targetted for typically four uplink channels, each dynamically configurable with respect to data rate. One high-speed downlink channel will be used to support the uplinks, and to provide control over the smart ground stations. For an excellent review of the design effort for the modulation techniques and access modes of these channels, see the paper "Modulation and Access Techniques for PACSAT" by Phil Karn, which is included in these proceedings.

Supporting these communications channels will be a series of filters, oscillators and amplifiers, along with microprocessors and buffer memory for channel control and support of link access protocols. These processors, with perhaps one or two channels per processor, will allow the demodulators chosen to be both adaptive in data rate and frequency agile.

The set of packages will have a common system controller and main memory unit (RAMUNIT). The software to support the higher-level protocols and application programs to be resident in the SCU will be loadable from the ground, a technique now common in the Amateur Satellite Service. A memory package in the megabyte range is being investigated.

Spacecraft/Experiment Interface

The spacecraft will provide the envvironment for PACSAT, including power, antennas and shielding from the extremes of space. A separate processor will handle the spacecraft's housekeeping functions, and separate communications channels will be available for satellite command. Standard interfaces will define the power busses as well as the digital communication between spacecraft and experiment processors, and the required telemetry and control functions.

Ground Stations

The PACSAT ground stations will be fairly complicated, requiring smart controllers to handle the requirements of frequency agility in the transmitters, and of linking, networking and

presentation control.

To allow users to ease into packet radio satellites, a gradual upgrade path is to be provided for PACSAT use. A required piece of equipment will be the modem, which will include a modulator, demodulator and pass-through path for transmitter push-to-talk and frequency control. This modem will be capable of operating as a stand-alone modem attached to one of the current types of packet radio terminal node controllers (TNC).

Operation of the TNC and modem pair with a standard set of 440MHz transmitter and 2 meter receiver will allow operation at 1200 baud. Higher speed operation will require a separate RF deck, with direct access to IF strips. Speeds of up to 9600 baud are planned.

A final touch would be a custom TNC, specifically designed for this system, and allowing direct interface to other TNC's for ground-based internetwork linking.

It should also be noted that conservative link margin calculations have shown that, with modest transmitter power on board the spacecraft and standard powere available to ground stations (around 25 watts), the requirement for having directional antennas is not necessary. Simple gain verticals like 5/8th whips on 440 and 2 will probably be quite adequate, especially at lower baud rates like 1200 baud.

Spacecraft/Ground Station Interface

The PACSAT Project intends to use omnidirectional antennas on two of the most popular VHF/UHF bands, in a mode which will be familiar to Phase III users. Uplinks will be available at around 435 MHz, and choice of the proper channel will be made by the ground station controller, following the command requests of the satellite. The common downlink will appear at the edge of the Amateur Satellite allocations, probably around 145.806MHz for one package and 145.994 MHz for the other.

The modulation technique, synchronization requirements, encoding mode and related parameters are to be determined, based on experiments to be performed by two different design teams this spring. It is assumed that either differentially-encoded phase-shift keying or minimum shift keying at rates in the 1200 to 9600 baud range, perhaps adaptively availble, are the most likely candidates.

The link-level access protocols, that is, the addressing and error detection schemes are planned

to be compatible with the AX.25 Amateur packet radio protocol standard. This protocol has already been implemented by several groups, and is a de facto AMSAT standard for all currently-planned packet satellite efforts.

The network protocol will probably support AX.25 network-level protocol, and perhaps also less complicated (and less reliable) "datagram-type" protocols as well.

The memory interface between ground stations and the on board RAMUNIT will be little more than a virtual disk drive, with a very noisy connecting link. On top of this protocol will lie an applications program which will provide a number of message and file services. Experimenters will be provided with lower-level accesses to the system where such access does not significantly disrupt normal use of the system.

PACSAT Project Status

The final conceptual review meeting was held in February 1983, and several of the design groups attended, including representatives from both VITA and the University of Surrey. Many of the more sophisticated concepts were thrown away to provide an easier target for scheduling. There will be a set of subsystem design meetings at this conference, and further meetings to be held later this spring. Negotiations are currently underway with the candidate launch agencies and design support groups.

System design is likely to be completed early this summer, with deliverable items to be integrated and tested this fall. Following critical design review meetings, spacecraft-ready subsystems will be prepared and shipped to the integrating agency by next spring. Such a schedule would allow AMSAT to take advantage of possible launch opportunities as early as late 1984. Slippages will be inevitable however, and more realistic times will in general coincide with the more likely target launch dates, early 1985 to 1986.

The project now has the support of twelve differennt design groups from four different countries, but is still in need of qualified hardware and software designers to help review all aspects of the current design, and provide needed manpower with several of the more important subsystems. PACSAT is an all-volunteer effort, and will require careful evaluation by the general user community during its initial phases to confirm design parameters and provide guidance in the utility of the various modes. It is hoped that this system will not only provide many services which are forecast for the digital

fututre of ham radio, but also create a whole new
set of users and uses yet to be imasined.

TO: HM
FROM: LJ
SENT: 05 MAR 83 02:14:12
READ: 05 MAR 83 02:54:48

Hey everybody!!!

We had a breakthrough at the Tuesday night fixit-fest, and located (probably) the PRIMARY source of deafness on the board. The good news is that it is TRIVIAL to fix it. I even fixed it on MY board, and that says a lot!

The problem: deaf boards, on a random or not-so-random basis. The first fix we learned about came from Mike Brock, WB6HHV in San Diego. Low voltage to the +/- 12 v supplys. We think this problem may be appearing on some, but not all boards, depending on the details of the transformer you got, and how the local utility likes to run its line voltage.
The cure is either to replace the +12 volt reg, with a 10 volt job, or by a lower voltage regulator with a suitable Zener in the in the sensing leg. This combined with a possible bigger filter cap ahead of the +12 v regulator should cure the problem PROVIDED YOU'VE GOT IT!! (Check first!)

The really good news is that we found the following: It seems that 79xx regulators take bigger caps on their output sides than do 78xx regulators. In fact, both the 7912 and the 7905 negative regulators have been observed to oscillate on the TNC with the current feeble bypassing on the output sides.
In the case of the 7912, the simplest fix is to add a 10 uF cap on the wire-wrap area, near the heat sink. I used an expensive tantalum job, but just about anything will work.
To put 10 uF across the the 7905 you have to remove the 0.1 uF already on the board and replace it by the 10 uF cap.
This has so cleaned up some of the hard-case boards we've seen here that they're impossible to make fail on receive.

One final item: A primary source of noise on the board, the 1488, should have its pins 14 and 1 connected by, say, a 0.1 uF cap.

Good luck to all
73
Dan Morrison

Posted: Thu Mar 3, 1983 5:36 AM GMT Mss: OGEE-1529-4852
From: PBARLOW
To: PACSAT
CC: DEN,AMSAT,ENG,DOCS
Sub: PACSAT DESIGN MEETING 01,001,A

This is a general overview of the events of the Pacsat Conceptual Design Meeting feb 25-27 in Washington . If any other details are needed in regards to the general meeting please feel free to contact me.

The meeting was called to order at [illegible] on [illegible] by Pacsat Project Manager Den Connors. Attendance was taken and two representatives of VITA where in attendance, (Harry Norman and Robert Reinins). Representing the UK was Martin Sweetins G3YJO. A total of 17 participients attended. An explanation of VITA and its needs were disscused. VITA brinsing technological help to 3rd world countries with over 4000 volunteers worldwide has a mail turn around time problem . A request for technical assistance takins only 1 or 2 weeks to process requires a round trip turn around time of 1 to 2 months or more! With the importance of an expidition turn around of technical data their current system is anything but adequate. Design work on the system has begun with support from VITA ($15000 small grant). Additional funding will be obtained from outside sources as VITA Satellite System and Launch Opportunities were disscused with a look at the mode of operation for the 80's and 90's. New technical opportunities, organizational and international opportunities. The possibility of Martin Sweetins UoSat group working in areas of space craft development, structure ,bus systems and mechanical requirements. Den Connors discussed the ties with Amsat and TAPR. The roll of PACSAT , R&D ,Gateways,Ground stations, users, and internetworkins were brought up.The followins ideas were disscused: AMRAD's involvememt and hish interest in technology, writins standards (AX.25) and technical problems . The new ARRL Tech Manager Paul Rinaldo wil be brinsins new input and direction in computer and radio networkins to the league.
A proposal of construction and design, project taskins, group structure, money and a disscusion of the weekend's asenda followed.
Launch opportunities were presented by Jan King.
The possibility of SSI actins as host for the S/C. The problems of flyins on SSI -RFI -HiRes Image equipment, heavy interface problems.
Delta has provided 5 launches for AMSAT. Excelent payload.
The Shuttle looks to be the launch of the 80's -low cost with the Get Away can (28"x22"). Approval of Jetison will have to be obtained and the need to make it dual compatitble with both the Delta and the Shuttle . The best opportunity may be intersration on Landsat with hish polar orbit. A disscusion of low inclination verses hish inclination followed. Requirments of propulsion needed, Shuttle safety, fuel. Two techniques were disscused usins water as fuel.
1. Electrolysis, hish exit velosity but lons R&D and lots of testins and safety problems.
2. Steam expulsion exit velosity lower than #1, enersy needs about .75kwh/ks. Will require about 20ksm of water total mass about 70ksm which is still under NASA's ress.
Orbit transfer technique, simple approach usins set-away can

($10000/can) power budget 35 watts total, s-mall water jets to walk the S/C into orbit.

A list of launch dates were made :

1.	Landsat D/Delta	1985/8	99deg.x850km
2.	[illegible]	[illegible]	
3.	Landsat recovery	1986/8	98.2x580km
4.	SSI	1985	98x800kmm
5.	H-1 Japan	1986	98x800km

Financial concerns, legal, regulatory and the need for electronic mail, local management, utilization of talent.

The proof-of-concept experiment is designed to advance two of AMSAT's fundamental concepts: utilization of low earth orbits and demonstration of inexpensive satellite technolsy . Cooperation with VITA provides a real test system with potentialy large benefits for a great number of users both in VITA and Amateur Radio. [illegible] positive cash flow, fund raising, generating interest and demand with the use of VOA and other outlets. For example, a simulation of the PACSAT experiment using either UoSAT 9 or Phase III. The diffitculties of this type of experiment were considered. A portable ground station would have to be built and a PACSAT simulation of store and forward could be [illegible] Third party agreements and STA would possibly have to [illegible] The developement of public relations activities with emphasis [illegible] technology, proof of concept, creating PR and a multi-National effort involving the United Nations.
The importance of open channels of communications to avoid the feeling of being disconnected from other members of the group [illegible] A overview of the following days agenda was [illegible]

[illegible]

Day two of PACSAT Concertual Design Meeting

Jan King's dscuion on link calulations, uplink and downlink link summary, system approach -using SSB or FM. A disscusion of loop tracking and lock up times followed. Phil Karn began his disscusion on access and modulation techniques: DPSK, QPSK,CPSK,FSK(SSB) and MSK(FFSK). Various access techniques were disscused: single rcvr vs multi rcvrs, Pure Aloha vs sloted Aloha also uplink baud rates and channels as well as downlink baud rates and channels, (n#of 1200 bps channels and n#of 9600 bps). Ground station interface and various forms of modem design [illegible] modulation techniques. Radiation problems, physical size of S/C test simulators, power, antennas and resources for mechcanical design were also mentioned.
Jan presented a outline of the S/C.

1.Structure

2.[illegible]
   a. solar arrays
   b. battery (6ah ni cd)
   c. charge reg. / power reg.

3.S/C controler,TLM,CMD,IHU

4.Attitude control
  a. magnet torquers
  b. nav. mag.
  c. sun sensors / horizon
  d. electronic interfaces

5.Propulsion
  a.electronics
  b.tanks
  c.thrusters
  d.misc.

6.PACSAT inst.

7.Others(misc).

8.Antennas

JAPAN'S PACSAT

1. JAS-1 Launch: 89-1 (Fasson)
2. 1988 (?) 500km
3. Digital and Analog
4. Mode J 2m u 70cm down
5. NEC in "advanced defin" stage
6. < 1200 bauds
7. FSK?

GROUND STATION

1. APPLICATIONS DEVICE (PC -RS232)

2. Link Control, Network ctrl ,Data Ctrl (TNC)

3. MODEM (1200-9600)

4. Standard 440TX (1200 bps) and RCVR 2m.

5. Special 440TX (9600 bps) and RCVR 2m.

FEB 27TH 1983 SUNDAY MEETING

SPACE CRAFT INTERFACE

1. Documentation

   a. Define (no. system)

   b. System level specs

   c. Interface specs

   d. Schedule - delivery dates (small)

e. Experiences & Problems

. Component list with order status - CO. & p

. Budset

. Test Status

. Materials (no PCV's or silicon srease)

. Radiation hardend and mil-spec

INTERFACE SPEC.

SIZE: OVERALL AREA

WT.

POWER, VOLTAGES, CURRENT, DYNAMICS

CONNECTORS- #OF, SEX, # OF PINS, LOCATIONS

PINOUTS

THERMAL DISIPATION

ENVIORMENTAL STRESS (OVEN TEST,FLEXINGBOARD,FREEZING,VIBR)

TEMP RANGE

EXPECTED ENVIROMENT INSIDE S/C -10C+-45C

VIBRATION 5HZ TO 200HZ - 1.5 TO 2.5G

RANDOM VIBRATION TEST (WHITE NOISE)

MAGNETICS : SPECS TBD

ER,DYNAMIC RANGE,SWITCHING,IHU,TELEM.

PARTICLE RADIATION

INDEX SYSTEM

It would be greatly appreciated if everyone leavins documents would plea add a 1 to 4 line abstract at the besinins of your document. I will then extract the header and and pass it to the new bulletin board: INDEX. This way even if the system has been pursed a list of all documents relatins to this will be available.If there is a need for a Document that is no lonser in the BB please make a request to me and I will it to the Pacsat BB for a few days. An index and storase system has been created to keep track of all documents and correspondence. Here is a list of general catesories:

GENERAL CATEGORIES

0. Project Coordination
1. Systems
2. On board experiment
3. Spacecraft
4. Ground station
5. Spacecraft experiment interface
6. On board experiment / ground station interface
7. Launch vehicle

SUBSYSTEM CATEGORY

0. Project Coordination

1.Meetings
2.Travel
3.
4.
5.

1. System

1.Applications Software
2.AX.25
3.
4.
5.

2. On Board Experiment

1.System control unit (SCU)
2.Channel control unit (CCU)
3.Mass Memory Unit (MMU)
4.Modem unit (MDU)
5.
6.

3. Spacecraft

1.Structure

This should give us a starting point. If you are working in one of these areas and have subtopics to put under the general catesories please leave a message in the Index BB or Packsat. A document # and a rev letter would follow the two disit identify number.
Example: Packsat Concept Design Meetins - 01,001,A
(Project coordination - Meetins - document # 1 Rev A)

tnx 73 Karl

Posted: Wed Mar 2, 1983 6:16 PM PST Mss: ZGEE-1529-4343
From: PKARN
To: docs
Subj: Usenet & Packet Radio - the future?

The following is an article pulled off of the "usenet" computer network. Usenet consists of a loose collection of computer systems in North America, Europe and Australia all running the Unix operating system. When a user 'posts' an 'article' to the network, it is placed into a file for other users on that system to read. Also, his system auto-dials up a set of 'neighbor' sites which in turn keep a copy for their local readers and, according to their routing files, distribute it further. In this fashion, articles ripple (flood?) out to all sites. Duplication is checked for; each article has a unique ID which is checked against all previously received items and rejected if it has already been received. Part of the fallout of this system is that private mail routes to systems not known to the originating system can be obtained by looking at the path given articles take.

I think Usenet is interesting because it has much of the same flavor and characteristics of amateur radio: no centralized control (some have proposed that it be renamed 'Anarchnet'); and perennial discussions about what is and isn't "appropriate" for the net (some articles are reminiscent of 2m FM in Southern California).

In any case, what follows is a list of the "newsgroups" into which articles can be classified on Usenet. Its a pretty wide-ranging list, and I think it is food for thought as to what our packet radio capability might do for us some day when it becomes widespread. There seems to be an endless variety of possible topics for such a network.

73,
Phil

From mhtsa!alice!alb (Adam L. Buchsbaum) Tue Mar 1 15:45:23 1983
Subject: List of Active USENET Groups
Newsgroups: net.news.group

The following is a list of currently active USENET newsgroups as of 1 March, 1983. There are two basic subcategories of netwide newsgroups: net.all and fa.all. net.all consists of USENET bulletin board newsgroups that are circulated around the entire net; fa.all is a set of groups that are gatewayed to USENET from the ARPANET. The fa.all groups consist of mainly digests, though there are some bulletin boards. Some of the net.all and fa.all groups are gatewayed between the networks, i.e. items submitted from the ARPA side to the digest are split up and submitted to the USENET group, while articles submitted on the USENET side are bundled up and submitted to the digest. To post to fa.all groups, send mail back along the return address found in the From line of the articles. There are other subcategories but they are local, local to institutions, local to geographic regions, etc. and are not listed here. Please report any corrections, additions, etc. to this list to me.

Adam Buchsbaum
research!alb

Newsgroup	Description
net.adm.site	Automatic maintenance of the USENET directory. Currently experimental.

```
net.ai                  Artificial intellisence.
net.applic              Applicative lansuase and related architecture.
net.arch                Computer architecture.
net.audio               Hish fidelity audio.
net.auto                Automobiles and automotive products and laws.
net.aviation            Aviation rules, means, and methods.
net.books               Books of all senres, shapes, and sizes.
net.buss                General bus reports and fixes.
        net.buss.2bsd           Subsroup for UNIX* version 2BSD related buss.
        net.buss.4bsd           Subsroup for UNIX version 4BSD related buss.
        net.buss.usg            Subsroup for USG (System III, V, etc.) buss.
        net.buss.uucp           Subsroup for UUCP related buss.
        net.buss.v7             Subsroup for UNIX V7 related buss.
net.chess               Chess and computer chess.
net.collese             Collese, collese activities, campus life, etc.
net.columbia            The space shuttle and the STS program.
net.cooks               Cookins, cookbooks, and recipes.
net.cse                 Computer science education.
net.cycle               Motorcycles and related products and laws.
net.dcom                Data communications hardware and software.
net.decus               DEC* User's Society newssroup.
net.emacs               EMACS editors of different flavors.
net.eunice              The SRI Eunice system.
net.flame               For flamins on any topic.
net.followup            Followups to articles in net.seneral.
net.sames               Games and computer sames.
        net.sames.emp           Subsroup for Empire.
        net.sames.frp           Subsroup for Fantasy Role Playins sames.
        net.sames.pacman        Subsroup for Pacman.
        net.sames.pbm           Subsroup for Play by Mail sames.
        net.sames.rosue         Subsroup for Rosue.
        net.sames.trivia        Subsroup for trivia.
        net.sames.video         Subsroup for video sames.
net.seneral             General queries, requests, announcements, etc.
net.sraphics            Computer sraphics, art, and animation.
net.hamradio            Amateur Radio practices, contests, events, rules, etc.
net.info-terms          All sorts of terminals.
net.invest              Investments and the handling of money.
net.jobs                Job announcements, requests, etc.
net.jokes               Jokes and the like.  May be highly offensive.
        net.jokes.d             Subsroup for discussions on the content
                                of submissions to net.jokes.
net.lan                 Local area network hardware and software.
net.lans                Different computer lansuases.
        net.lans.ada            Subsroup for Ada*.
        net.lans.apl            Subsroup for APL.
        net.lans.c              Subsroup for C.
        net.lans.forth          Subsroup for Forth.
        net.lans.lisp           Subsroup for LISP.
        net.lans.pascal         Subsroup for PASCAL.
        net.lans.prolog         Subsroup for PROLOG.
        net.lans.st80           Subsroup for Smalltalk 80.
net.lsi                 Large scale intesrated circuits.
net.mail                Proposed new mail/network standards.
net.math                Mathematical discussions and puzzles.
net.med                 Medicine and its related products and regulations.
net.micro               Micro computers of all kinds.
        net.micro.432           Subsroup for 432's.
        net.micro.68k           Subsroup for 68k's.
        net.micro.apple         Subsroup for Apple's.
        net.micro.atari         Subsroup for Atari's.
```

net.micro.pc Subgroup for IBM personal computers.
net.micro.zx Subgroup for zx's.
net.misc Miscellaneous discussions too short lived for their own groups.
net.movies Reviews and discussions of movies.
net.music Music lovers' group.
net.news Discussions of USENET itself.
net.news.b Subgroup for B news software.
net.news.config Subgroup for postins of computer down times and network interruptions.
net.news.group Subgroup for discussions and lists of newsgroups.
net.news.map Subgroup for maps.
net.news.newsite Subgroup for new site announcements.
net.nlang ''Natural'' languages.
net.notes Notesfile software from the University of Illinois.
net.periphs Peripheral devices.
net.philosophy Philosophical discussions.
net.physics Physical laws, properties, etc.
net.poems For the postins of poems.
net.politics Political discussions. Could get hot.
net.railroad Railroad services and interruption of same.
net.rec Recreational/participant sports.
net.rec.birds Subgroup for bird watchins.
net.rec.boat Subgroup for boatins.
net.rec.bridge Subgroup for bridge.
net.rec.caves Subgroup for cavins.
net.rec.coins Subgroup for coin collectins.
net.rec.photo Subgroup for photography.
net.rec.scuba Subgroup for SCUBA divins.
net.rec.ski Subgroup for skiins.
net.rec.skydive Subgroup for skydivins.
net.records Records, both new and old, of all musical varieties.
net.religion Religious, ethical, and moral implications of actions.
net.rumor For the postins of rumors.
net.sf-lovers Science fiction lovers' newsgroup.
net.singles Newsgroup for single people, their activities, etc.
net.social Like net.singles, but for everyone.
net.sources For the postins of software packages.
net.space Space, space programs, space related research, etc.
net.sport Spectator sports.
net.sport.baseball Subgroup for baseball.
net.sport.football Subgroup for football.
net.sport.hockey Subgroup for hockey.
net.startrek Star Trek, the TV show and the movies.
net.suicide Suicide, its causes and effects (!).
net.taxes Tax laws and advice.
net.test For testins of network software. Very boring.
net.travel Travelins all over the world.
net.tv The boob tube, its history, and past and current programs.
net.ucds The UNIX circuit desisn system.
net.unix-wizards Discussions, bug reports, and fixes on and for UNIX. Not for the weak of heart.
net.usenix USENIX Association events and announcements.
net.usoft Universal software packages.
net.usoft.s Subgroup for the S Statistical Package.
net.video Video and video components.
net.vvs The Vortex Video System for digitized video images.
net.wanted Requests for things that are wanted: e.g. device drivers, pointers to people, etc.
net.wine Wines and wine tastins.

net.wobeson	That radio show.
net.women	Women's rights, discrimination, etc.
net.wurks	Assorted workstations.
fa.arms-d	Arms discussion digest.
fa.arpa-bboard	ARPANET bulletin board.
fa.bitgraph	The BBN bitgraph terminal.
fa.digest-p	Digest-people digest.
fa.editor-p	Editor-people digest.
fa.energy	Energy programs, conservation, etc.
fa.human-nets	Computer aided communications.
fa.info-cpm	Control Program / Micro mailing list.
fa.info-terms	All sorts of terminals.
fa.info-vax	DEC's VAX* line of computers.
fa.info-vlsi	Very large scale integrated circuits.
fa.poli-sci	Politics and versus science.
fa.sf-lovers	Science fiction lovers' digest.
fa.tcp-ip	TCP and IP network protocols.
fa.telecom	Telecommunications digest.
fa.teletext	Teletext digest.

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* UNIX is a Trademark of Bell Laboratories.
* DEC is a Trademark of the Digital Equipment Corporation.
* VAX is a Trademark of the Digital Equipment Corporation.
* Ada is a Trademark of the Ada Joint Program Office of the Department of Defense.

To: Hank
From: Bill N6FQR and Ron WA6JFZ
Subject: New protocol testing

Hank,

Last night, Ron and I managed to make a connection using the new protocol. However, to do this, I had to rebuild my side of the program using the call W6FQR. Note: We don't seem to be in the magic range for the repeater.

When we were testing using our real calls, we could not successfully make connections and generally one side of the connection would hang in some way. Possibly, the extra echos from the old repeater were confusing things? Maybe it appeared to the system that two people were trying to connect to it?

I think when you and I made our connection the old repeater was down. I guess we need to try and understand what is happening with the old repeater, e.g., how does it screw up connecting? I understand why it repeats, but not how it effects the new protocol implementation and if it is tic

If you have any ideas, let me know,

Bill

Hank,

Re: March QST

page 29 - call for papers
page 63 - what is packet radio
page 71 - digipeater
page 74 - pacsat

Re: March 73

page 96 - san francisco ca
mar 19

This is all the information that is in the "ham pass" pertaining to the up-coming conference. If you do a FRNET broadcast, please ask fellow packeteers to mention the conference via computer bbs, rtty mailbox, nets, and club meetings, etc. At this point all can help.

oh well, don't wire wrap ur fingers to the board (chuckle) 73, Curtis

Good Morning Hank,

Due to a time factor, and other projects that I am involved in, I have deceided that the best way to set this project done, is to pick up the following items:

2 print ribbons
1 print wheel
& enoush paper to print 1 or 2 orsinals
(depending on how many you think we need-
the file is 182 pages)

If you could loan me the above items, I will pick them up sometime around 10-10:30 am. What I do not use, I will return back to you, and replace what I use from the sale of the QST file. I will come back here, make the copy/copies, and put them in the mail back to you. When we meet again I will return the unused materials. Since I have the orisinal edited files here; I will work on the transmission problem later; probably after the conference, when I have time.

If this file is received without the spaces, I have discoverd the problem, and would have to re-edit the entire file, which would take to lons. (WORDSTAR vs PROTOCOL WARS).

Call me if this is not ok with you as I will probably leave here around 9:30 am today, Tuesday.

73, and I hope best,... Curtis

TO: HM
FROM: DC
SENT: 28 FEB 83 19:[illegible]
READ: 01 MAR 83 00:07:19

The PACSAT Project has just completed its first milestone last weekend, with the final conceptual design meeting that was held at Goddard. Details on the specific tasks accomplished, and on the next design steps, will be forthcoming this week.

PACSAT continues to need volunteers in the design and prototyping phases, so please keep your eyes and ears open for interested volunteers. To aid interested people in finding the right people to call, here is a list of current managers and group leaders.

Dan Connors KD2S - Project Manager
Harold Price NK6K - Software Systems Manager
Port Barlow WA1DCT - Documentation Manager
Ian King W3GEY - spacecraft system definition, launch vehicle interface
[illegible] W3IWI - system concept, user services definition
[illegible] KA9Q - modulation and access techniques
Larry Keyser WA3ZIA - memory system

More groups will be formed following the next design meetings to be held in San Francisco on Friday and Saturday nights, March 18[illegible] several other individuals who have volunteered to assist in the design aspects, and others who have been targeted. Please talk to any of the above people to find more information, including the best way for you to get involved.

73, Dan

Hank,

On the current JAN83+ QST file the following message appeared:

WARNING: FILE DOES NOT EXIST, FILE QST.83.02.17.0KA6M

Hope it wasn't important, cause I am down to the last edit....
One other thing is the information for the poster/handout.

-73- Mike-

To: All Packeteers
From: Hank Magnuski, KA6M
Date: 22 February 1983

Subject: Housing Information for 2nd ARRL Packet Conference (Revised)

The following hotel is recommended for out-of-town packeteers attending the ARRL Packet Radio Conference:

Holiday Inn/Civic Center
50 Eight Street
San Francisco, CA
415-626-6103

This hotel is about 1 1/2 blocks from the Civic Center, and prices for rooms are $68 for a single, $78 for Double/Twins. The Computer Faire has reserved a large block of rooms at this hotel, and the simplest way to confirm your your reservation is to send a letter (or the form in the back of the Silicon Gulch Gazette) to:

Computer Faire Housing Bureau
San Francisco Convention & Visitors Bureau
P. O. Box 5612
San Francisco, CA 94101
415-974-6900

They will be able to book rooms until 5 days before the Faire (the February 17th deadline in the Gazette is incorrect) at which time the rates expire and the space reverts to the hotel's control. Reservations are valid until 6 pm unless you have called the hotel with your credit card number. Write your reservation letter today, because these rooms are going fast. You can call the hotel direct, but the rate may be 10-15% higher. Call the hotel direct for cancellations or any changes.

After arriving at SFO Airport, take an Airporter Bus to the terminal at Taylor and Ellis. Fare will be around $4.50. Then take a taxi to the Inn. The taxi will cost about $3.50. Taxi fare is about $7.00 from the airport.

The San Francisco Radio Club has agreed to co-host the meeting and is offering the services of its repeater W6FW (144.55/145.15) to all packeteers. If you need help or information, place a call on that machine.

The schedule for the meeting includes these special events:

3/18	9 am - 6 pm	Faire meetings and exhibits
3/18	7 pm - ?	Dinner for speakers and committee members
3/19	9 am - 6 pm	Packet Conference
3/19	12 noon - 1 pm	Informal Luncheon at Salmagundi's Restaurant
3/19	7 pm +	No formal plans - you're on your own
3/20	9 am	Breakfast at Zim's Restaurant
3/20	10 am - 12 noon	ARRL Digital Committee Meeting

In addition to the ARRL Conference, Hank Magnuski and Paul Rinaldo will be speaking on Packet Radio during regular Faire sessions. As of this date the exact time of these presentations has not been confirmed.

Preregistration special rates expire March 7th. I should have your check for $19 (Faire registration plus conference proceedings) in hand no later than March 1st, or you may not be able to get the special rate.

If you want more general information about the Faire, call or write Faire HQ

TO: HM
FROM: LJ
SENT: 24 FEB 83 00:06:47
READ: 24 FEB 83 02:25:49

Hank,

I think ONTYME lost the note I sent yesterday. I sent everything but boards (TNCs, transformers, cables, manuals) to Bob Reilins this morning, UPS collect. I attempted to call him last night to confirm everything, but he seems to be out of town.

Things are looking good for getting the boards out next week.

73,
Mat KV7D

To: Packet Conference Speakers and Committee Members
From: Hank Magnuski, KA6M
Date: 22 February, 1983

Subject: Pre-Conference Dinner, 18 March 1983

We are arranging a special meeting for all Conference Speakers and Committee Members. Space will be limited and is reserved for those who've made contributions to the [illegible].

The location will be

All You Knead
1466 Haight St.
San Francisco, CA 94117

on Friday, March 18th, 1983, at 7 pm. Please let me know if you plan to attend. We will try to arrange transport, as this is not near the conference.

After the dinner, at around 8:30 pm, we have been invited to continue our discussions at the home of Curtis Spangler, N6ECT, one of PPRS's most active members.

Curtis Spangler, N6ECT (415) 552-3430
644 Ashbury Street
San Francisco, CA 94117

This is just a short walk from the restaurant.

We look forward to having you join us.

73, Hank Magnuski

and ask to be sent a copy of the Silicon Gulch Gazette!

Alexander Faire
345 Swett Road
Woodside, CA 94062
415-851-2077

Hope to see you in March!

73, Hank

(Please disregard the previous notice. The hotel reservations could not be booked, contrary to what I was told on the phone.)

TO: HM
FROM: LJ
SENT: 22 FEB 83 03:57:22
READ: 22 FEB 83 06:50:11

To: Paul Rinaldo

CC: Hank Magnuski

Re: 16-Transition Preframe Sync

Paul,

I read your message dated 21 Feb regarding the sync requirements for the various HDLC controllers being used, or planned for use, in Packet radio (I8273, WD1933, Z8530).

The WD specs are not as detailedas the Intel with regard to the number of transitiions required to assure "lock" to the center of the bit field. However, while Intel does provide a nonstandard sync command to assure sync, it is unclear to some of us at present just how important it is to be sampling the data at the "exact" center or the bit.

We are currently sending frame sync headers during transmitter keyup time and have noticed no problems directly attributable to a lack of ability in getting the DPLL sufficiently "locked" before address, control and data fields commence.

The 1933 is particularly unfriendly. The lack of direct user control over the state of the Tx Data pin forced us to redesign the Modem to allow on/off tone keying for CWID on the TAPR TNC. (I suppose the main claim to fame of this chip is that it is CHEAP -- $14.)

The though of having to modify 180 TNCs in the field is not pleasant. Several of us have discussed the pre-frame sync proposal, and have certain reservations.

1) What ios the minimum useable keyup time before a user can safely send data? There are many parameters to consider here, including transmitter characteristics, receiver stabilization time, MODEM lockup time, repeater keyup (if used), etc.

It has been our limited experience so far that these are the big delays in getting a packet started. kWe currently fill this time with flag bytes, and have had no problems to date with lost data (causing retries) that have been traced to lack of HDLC DPLL sync.

2) How close to "dead center" in the bit time must the PLL sample the bit for data integrity? I expect this depends on the particular noise the system has in the communications link, but perhaps some Packeteer can model this and come to some conclusions. I am sure that more sophisticated Modems will appear in the future that use statistical sampling, or majority sampling, tech niques to help noise tolerance, but that will ahve to wait...

To adopt a 'standard' based on the particular requirements and/or shortcomings of a particular chip (the 8273 in this case), seems a bit strong. Some feel it may also be premature.

I don't know of anyone who has voiced an objection to the premise that preframe transitions are a good thing, but most of my contacts feel that adopting a "standard" is not good. Perhaps a "recommendation" is more in line, at least until some hard evidence can be assembled to support it as a need.

Thankyou for the opportunity to comment -- please keep us in the loop! There will be continued discussion on this question in the future here.

73's Lyle

TO: HM
FROM: DC
SENT: 22 FEB 83 06:46:30
READ: 22 FEB 83 06:51:48

to all PACSAT team members
from Dan, KD2S

the following is a partial list of people who are attending the Conceptual Design Milestone Meeting this weekend at Goddard Space Flight Center, or who cannot make it, but will be working on the team at least through the design phases. Some people may change their minds, and some unannounced people will undoubtedly show up.

From Tucson, I will represent the Tucson Amateur Packet Radio Corporation. Lyle Johnson WA7GXD, our new President, will be unable to attend the meetings, but will be able to provide both general digital engineering consulting and provide parts procurement services.

Phil Karn KA9Q will be providing the results of a large variety of systems concepts arguments, and will provide an enormous amount of engineering expertise on all aspects of the project.

Harold Price NK6K will be representing the Los Angeles packet group, and has been the primary pre-architect of the software structure for the entire PACSAT system. Dave Henderson KD4NL will not be attending, but will be working with Harold on lower level interfaces.

Chuck Murcko N2AOL will be coming down from Central New Jersey. He and KM2T are bringing an expertise in microprocessor hardware and RF design, and are interested in both the general design and in the ground station design.

Port Barlow is the secretary for the project, and will provide the group with support. He just happens to be very active in the TAPR packet Beta test, and will be involved in the interface of the PACSAT system with ground networks, along with John DuBois W1HDX.

Larry Kesser WA3ZIA will be handling the static CMOS RAM architecture for the satellite subsystem. Although Larry won't be at the meeting, the Ottawa group should be represented.

Steve Robinson W2FPY and Vern Riportella have been looking at the bubble memory subsystems, and will be appraising us of this technology. Steve is the head of R&D for AMSAT, and will therefore be involved in several aspects of the system design.

Tom Clark has been the primary protagonist of PACSAT from before the beginning. He will be involved in all design aspects of the system, and should be the softest shoulder to cry on, next to mine.

Jan King has been working on the initial system design of PACSAT, and will continue as one of the primary architects, along with Karl Meinzer, especially in the fields of modulation techniques, spacecraft design and launch acquisition. Jan will be involved in discussions with a number of external groups as the VP of Engineering for AMSAT to smooth the way for PACSAT.

Martin Sweeting will be over from the UoSAT project office to provide the experience of the OSCAR 9 project, and to negotiate design efforts by the AMSAT/UK at Surrey team.

Miki Nakayama, the primary architect of JAMSAT's PACSAT project, will not

be attending these meetings, but will be involved in separate meetings next month on the west coast with the PACSAT team.

Hank Magnuski KA6M will also not attend. Hank is the manager of the AMICON subsystem on the Phase III bird, and will be at meetings next month also on the

Paul Rinaldo, W4RI, will be attending the Saturday meetings. Paul has been looking at modulation techniques for AMICON and HF linking, and is working on MSK modulation systems currently.

Bill Reed WD0ETZ has been working on packet bulletin board systems, and will be looking at the higher-level protocols for the PACSAT software.

Several other members of AMSAT should be available for the meetings. Bob Diersing N5AHD may be attending,as will Jim Skoog. Some of the AMSAT locals to the Washington area will hopefully also attend.

The Volunteers in Technical Assistance (VITA) will be sending one or two representatives to see the goings-on, and to report on VITA's fund-raising efforts.

Finally, it is hoped that members of the Independent Space Research Group (ISRG) who will be at AMSAT HQ that weekend will also be able to participate.

While this list is not complete, it should provide an indication of the level of representation at the meetings this weekend. There are several other groups who have expressed an interest in assiting, but who will not be at this particular set of meetings. I'll be updating this list as the project progresses.

73, Dan

Posted: Fri Feb 18, 1983 2:19 AM PST Mss: YGED-1523-4990
From: HPRICE
To: PACSAT
Subj: SOme thoughts on PACSAT software

Although there is little here that will directly effect initial hardware design, I think it would be a good idea to start getting a picture of what it is that all the hardware is up there for. The purpose of this document is to set down some ideas about the part of the PACSAT software not directly associated with spacecraft management and control. For lack of a better name, I'm calling it PACMMS for PACSAT Message Management System. Someone suggest a better one, please. Although parts of this document are written as if specific design decisons have been, of course they have not been. It is simply easier to write that way. What is presented here is a set of possible solutions to a list of suggested goals.

Harold Price, NK6K

As a starting point, the following assumptions are made:

1) A separate computer is providing spacecraft basic control and is maintaining a separate control link to the ground.

2) Large on board memory is available for bulk data storage.

3) A software upload capability exists, at least 16k of program memory is available.

In the main, PACMMS should be viewed as an integrated software system with components on PACSAT and on the ground that supplies a set of services to a user. A short summary of end user services is presented below:

- Mailbox. Mail messages are stored by PACMMS for later retrieval.
- File storage. Files may be stored on pacsat for later retrieval. Mail messages have a specific form and structure, files do not.
- Store and forward packet repeater.
- Real-time network communications node, i.e., a smart digipeater.
- Secondary telemetry path.
- Support environment for onboard "applications"

software, e.g. data gathering and reduction.

The followings are more detailed descriptions of some of the elements of PACMMS and should be viewed as goals to shoot for.

PACMMS

The satellite resident portion of PACMMS should be divided into to distinct parts, the "operating system" and the "application program". The operating system provides a set of services to the application, mainly in the areas of memory management and IO control. The operating system includes the software necessary to control the flow of data between PACMMS and ground stations, PACMMS and the control computer, PACMMS and the large memory.

The major advantage of this split is that the application software, the "bulletin board" system, can be designed to interface with a set of virtual devices. Checkout and testing can be done on a variety of ground based computer systems with floppy disk simulating the large onboard memory. As the inevitable hardware changes occur only the low level operating system routines will have to be changed.

PACMMS must also be a multiuser system. Several users can be "Logged on" to PACMMS at any time. Each must have a separate context area maintained, both at the protocol level and at the application level. Here again the operating system concept will be useful. As multiple users access multiple messages and files, standard OPEN/CLOSE/READ/WRITE operating system services will help solve multiple access and concurrency problems.

Mailbox.

PACMMS will offer an electronic mail service. Minimum attributes of mail messages would be from-address, to-address, creation date, title, and n lines of text. A minimal security mechanism should be provided to protect against accidental/malicious deletion of messages. Addresses should be callsign based. A mechanism for purging old messages should be provided.

Files.

Files are sent to PACSAT and stored for later retrieval. Files, unlike messages, have no internal structure forced on them by PACMMS. Files have names, creation dates, and the same level of security as is provided to messages. Files can also be created

by PACMMS for its own use,e.g., for the storage of telemetry. Other uses for files include storage of PACMMS application software, raw data to be transferred amoung ground stations, new software for ground station control ready to be burned into ROM.

Store and forward.

PACMMS stores packets received from ground stations and sends them~ thru the downlink when requested by the addressed ground station. This differs from messages and files in the PACMMS stores the packets without attempting to use the data in the packets. PACMMS acts as a delayed repeater, except that packets are acknowledged by PACMMS when sent and received. This allows ground stations to communicate with each other in a higher level protocol than PACMMS is aware of without forcing the constraints of messages and files.

Direct ground station link thru PACMMS.

PACMMS acts as a node in a local area network. Ground stations are connected to each other thru the network in real-time.

Telemetry

PACMMS supplies telemetry to the control unit and receives telemetry from the control unit for storage in files or immediate transmission on the data link. PACMMS will supply the ability to send data on the downlink in a broadcast mode, i.e. not to any specific ground station.

Ground stations

PACMMS also lives on the ground. Commands to PACMMS will be parsed on the ground to reduce comm-link requirements. A token language to communicate with satellite resident PACMMS will be developed. PACMMS will be optimized to work with its own ground software, but some less robust interface should be provided to those wishing to develop their own ground software. Access via the simpler interface will not be permitted to adversly affect users of the full ground station software however.

Data compression.

PACMMS ground stations will compress data before transmission and

decompress during reception to reduce comm-link loading. A compression standard must be agreed upon and added to the protocol definition. The standard compression must be used when sending commands to PACMMS but any method may be used for data destined for files or store and forward packets. Control and address fields in packets should not be compressed.

Security

PACMMS will provide password security for messages and files. Options include password required to LIST/READ and password required to delete. This will guard against accidental deletion and supply protection against malicious deletion from all but those ground stations with can hear your uplink signal.

Capability must be provided for a "system administrator" to delete messages and files regardless of password protections. One solution is to require that privileged commands be sent thru the control link to "unlock" the data base for a particular user.

Following is a first shot at breaking the PACMMS software down function areas for the purposes of phased development by different groups of developers. Each line item could be a separate task and in most cases can be broken down into several sub tasks.

1	Satellite resident
1.1	PACMMS operating system
1.1.1	Control computer interface - Telemetry to and from, commands from
1.1.2	Mass store system
1.1.2.1	High level functions, OPEN/CLOSE/READ/WRITE
1.2.2	Low level functions, get/put byte through serial interface.
1.1.3	Ground station interface
1.1.3.1	Data acquisition - modem control, RF control
1.1.3.2	low level protocol handlers - collision control - channel scheduling
1.1.3.3	High level protocol handlers - Path managementt.
1.1.3.4	Network node functions not requiring message system control - store and forward?
1.2	Application software
1.2.1	User management - logon, status. Maintain list of

current active "users" (ground station in active communication).

1.2.2 File system

1.2.3 Mail system

1.2.4 Administrative functions - mass store purge, reconfiguration of memory or data links - possibly via control link.

2 Ground station

2.1 User interface software - user to PACMSS (1)

2.2 Data link control - protocol drivers

2.3 Ground station hardware control - RF, modem, low level IO.

2.4 Interface to ground based networks - network node - gateway to PACSAT

TO: MM
FROM: PLR
SENT: 20 FEB 83 16:19:42
READ: 21 FEB 83 16:42:15

Hank,

BETA testing has commenced on your new software. I added our famous code to delay for slow relay rise (and our slow repeater) and burned proms. Terry and I have begun using the software with interesting results.

Terry has coded up the new repeater by changing the old repeater and we have been testing it using his S100 8273 board. He is as I type burning it into 2716 for his VADCG board.

The follwowing has been noted:

1. The famous Hank Incestous connection does not work anymore. The board allows the connection, but then quickly disconnects.
2. A new kind of forever packet has developed. In the old style, which could be forced by RF feedback, the board sent reversals (10101010) until reset was hit or the timeout timer got it (assuming you have one). In this new packet, a single short packet is sent over and over forever. It sounds neat, but is not appreciated. The unfortunate thing is I don't remember what I was doing to cause it and it has only happened once. As we get some more miles on the board, maybe it will show up again.
3. We love the debug mode although ASCII out to the side would be neat. I know there is only so much room for code. Seeing the Line Buffer contents is neat.
4. Any ideas how to address the repeater beacon packets coming out every four minutes? Terry now has Test WB4JFIO WB4JFIO. Guess it is not really a big thing since monitor mode is just convenience anyway. The repeater did grow to 2 2708s or 1 2716 as the new packets have more stuff and we were up against the 1K before.
5. Tom Clark brought back a TAPR board on his last trip, but has not showed up on the machine to test with. I am awaiting connection with a TAPR board. I understand they didn't do PID.
6. We are confused on come-uppance. I cant seem to see packets from Terry until I hit NR for no-repeat. More experience is needed. I hard coded K3NA/R into the repeater address, getting ready for Eric's return. We will be ready.

More news to follow. Send your experiences. This is at least as much fun as our first week on [illegible] years ago.

Dave, K8MMO

Hank,
I can now hear both repeaters and have a question about the beacon.

(@@@<1^$aPThis is the KA6M beacon in Menlo Park CA (Rev. 5.00)
(@@@<1^$aPThe quick brown fox jumped over the lazy dog's back.
(@@@<1^$aPThis is San Francisco's first packet repeater.
(@@@<1^$ae..... .... active
1

What you see above, is exactly how I receive the beacon. When I go to print it out, it gives me one line per page, i.e. 4 pages. Another interesting thing that happened, was that when the Menlo Park repeater did the ID, I got a DDDDDD from the DG, and had to reconnect.

I would be interested in any other comments, regarding the use of two repeaters on the same frequency, and wonder, if my signal gets repeated by both machines. 73 es best -cas-
)

Hank, the southern repeater, when it ID's, definitely does kick me off the DG. I will try an experiment using self-connect, to see if it happens then. 73 TTYL -cas-

Posted: Thu Feb 17, 1983 6:24 PM PST Mss: DGED-1523-4163
From: URIP
To: amsat
Subj: Friends of AMSAT

K1ZZ (ARRL General Manager) announced today the Paul Rinaldo, W4RI, has been named to replace the retiring Doug DeMaw, W1FB.

Paul is a long-time AMSAT member (LM-36), is President of AMRAD and currently edits QEX, the ARRL's advanced experimenters newsletter.

Paul will start his new job as QST Senior Technical Editor and Manager of the Technical Department in early May. He will be moving to the Hartford area this spring.

W4RI is one of the main forces in the packet radio field and promises to bring a distinctly progressive approach to his new job reporting directly to K1ZZ. Good luck to Paul from all of AMSAT!

----WA2LQQ

TO: HM
FROM: PLR
SENT: 21 FEB 03 02:54:42
READ: 21 FEB 87 16:43:54

To : Hank Magnuski, KA6M
Lyle Johnson, WA7GXD
Info : Doug Lockhart, VE7AFU
From : Paul Rinaldo, W4RI
Subject: Preframe Sync

Thank you, Hank and Doug, for the previous input that you gave me on this subject. I have gone over it several times with Bob Watson with sufficient time for him to reflect on the alternatives.

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(The standard would say that the sending station must send the agreed pattern ahead of all packets. That would permit the DPLL to achieve bit synchronization before the flag character is received and thereby minimize the chance of misreading the flag. That would also permit flag recognition even when the S/N is poor.)

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Those are the apparent options. Here are my tentative conclusions:

We should standardize, as soon as possible, on always sending 16 reversals of preframe sync.

Generating preframe sync on the modem is possible. However, the mixture that we will have of existing and (yet-to-be-produced) modems makes this a nonuniversal, and therefore an undesirable, solution.

It is desirable to generate 16-reversal preframe sync on the TNC/PAD (not the modem).

That leaves us with:

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doins it, and

(c) a problem settins the 1933 to do it.

I'd appreciate any comments, particularly any thoushts on whether anyone can think of a way to make the 1933 senerate preframe reversals.

73, Paul, W4RI

MSG#:A62635
IN#: 231
TO: HM
FROM: PRNET TC
SENT: 19 FEB 83 15:54:14
READ: 21 FEB 83 16:41:21

Hank,
Was just lookins for the TIP/LIP05 source and can't find it here. Thousht you sed you had it on ONTYME. W How do I find it?

Doesn't look like I'll be able to make the west coast meetins, but should be in SFO area (Ames) 3/30-4/1. Perhaps we should have a chat then. Will you be here next weekend?

tom

MMO#:A63708
IN#: 232
TO: HM
FROM: DAL
SENT: 20 FEB 83 15:00:00
READ: 21 FEB 83 16:41:28

Hank:

I hope this sets to you in time to help me with my accommodation at the conference. Letters to California are takins a week to ten days and sometimes lonser - up to thirty days once from California to Vancouver.

If possible I would like you to arrange a single room for me at the Americania. I will be arrivins on Thursday but, unlike the others, I will be departins on Monday, the twenty-first of March. I will be arrivins in California at LAX on Sunday, March 13 and will be stayins a few days in the LA area before travellins up to San Francisco. The cheap fare I sot only allows me to fly on weekends. (They include Monday in the weekend for return flights.) I fly back to Toronto from SFO on Monday afternoon.

I would like to try to set in touch with some of the active packet radio people in the LA area while I am there. Could you supply me with some names and telephone numbers and a seneral description of the packet radio situation in LA? It has been about three years now since I have been there and at that time nothins was happenins. I know that situation has chansed now.

Thanks for your help.

73, Dous, VE7APU/3

MSG#:A63710
IN#: 233
TO: HM
FROM: PLR
SENT: 20 FEB 83 16:19:42
READ: 21 FEB 83 16:42:15

Hank,
BETA testins has commenced on your new software. I added our

famous code to delay for slow relay rise (and our slow repeater) and burned proms. Terry and I have begun using the software with interesting results.

Terry has coded up the new repeater by changing the old repeater and we have been testing it using his S100 8273 board. He is as I type burning it into 2716 for his VADCG board.

The followwing has been noted:

1. The famous Hank Incestous connection does not work anymore. The board allows the connection, but then quickly disconnects.
2. A new kind of forever packet has developed. In the old style, which could be forced by RF feedback, the board sent reversals (10101010) until reset was hit or the timeout timer got it (assuming you have one). In this new packet, a single short packet is sent over and over forever. It sounds neat, but is not appreciated. The unfortunate thing is I don't remember what I was doing to cause it and it has only happened once. As we get some more miles on the board, maybe it will show up again.
3. We love the debug mode although ASCII out to the side would be neat. I know there is only so much room for code. Seeing the Line Buffer contents is neat.
4. Any ideas how to address the repeater beacon packets coming out every four minutes? Terry now has Test WB4JFIO WB4JFIO. Guess it is not really a big thing since monitor mode is just convenience anyway. The repeater did grow to 2 2708s or 1 2716 as the new packets have more stuff and we were up against the 1K before.
5. Tom Clark brought back a TAPR board on his last trip, but has not showed up on the machine to test with. I am awaiting connection with a TAPR board. I understand they didn't do PID.
6. We are confused on come-uppance. I cant seem to see packets from Terry until I hit NR for no-repeat. More experience is needed. I have coded K3NA/R into the repeater address, getting ready for Eric's return. We will be ready.

More news to follow. Send your experiences. This is as least as much fun as our first week on packet years ago.

Dave, K8MMO

TO: HM

Hank,

We read your note about hotel arrangements. Thanks for getting things up. Unfortunately, we have a change. Dan's sister lives in San Francisco, and we will be in trouble if we don't stay with her. Can you cancel us out with the hotel or should we contact them directly?

Lyle will forward any reply via this medium. Hope to see you soon. I guess you know by now that Dan has promised SF boards by the 19th, and hopefully sooner.

73,

Margaret KV7D

TO: HM

FROM: PLR
SENT: 21 FEB 83 02:56:42
READ: 21 FEB 83 16:43:54

To : Hank Magnuski, KA6M
Lyle Johnson, WA7GXD
Info : Doug Lockhart, VE7APU
From : Paul Rinaldo, W4RI
Subject: Preframe Sync

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I'd appreciate any comments, particularly any thoughts on whether anyone can think of a way to make the 1932 generate preframe reversals.

73, Paul, W4RI

Posted: Mon Feb 14, 1983 9:45 PM PST Mss: UGED-1521-5254
From: TCLARK
To: packsat
Subj: TAPR Beta Testing
Fellow BETAers:

A few TAPR TNC related items:

(1) Sussested addition. Put 4.7k to 10k pull-up resistors on J2 pins 7,14,15 to +12vdc to force DSR, CTS and DCD true even if nothins is connected.

(2) If you set any reports of excessive 5vdc ripple or over-heatins xfmrs, the xfmr connector is probably plussed in back-wards. (Yes, I soofed here. NO damase except to my eso).

(3) I can't seem to set PERM to chanse the NOVRAM. If I boot from ROM default at 300 baud, then diddle some parameters (MYCALL, ABAUD, etc), the parameters take fine by throwins S1 and typins RESET. But PERM does not save them, so I have to so thru the 300 baud boot each and every time. Any ideas?

(4) Has anyone sot a fix for the reset problem? On power-up the TNC is catatonic until the S3 reset switch is thrown. The 100uf cap should make a clean POC, but doesn't do the trick.

(5) Any ideas when a software patch to solve the PID bus will be issued? Will it necessitate major surgery or can it be easily patched locally. I'd like to set the locals off on the risht foot here.

(6) Hank sez that he has TIP/LIP05 for VADG AX.25 in Beta-testins phase now. How soon can we put VADG to rest totally?

(7) For those of you wonderins about how wide-spread we are, the AMSAT Beta sites include boards (2 each) for ZS, ZL and JA. Who will set the first packet WAC? I offer the challense that I currently am leadins the WAS tally with 3 (MD,VA,TX). Any challensers? Who (besides N5AHD and I) are set and rarins to so on 10 meters?

tom

To: All Packeteers
Fm: Hank Magnuski, KA6M
Dt: 14 Feb 83
SJ: Packet Meeting for February

The next meeting of the Pacific Packet Radio Society will be held

THURSDAY, FEBRUARY 24, 1983, 8:00 PM

at the AMPEX cafeteria on Broadway in Redwood City, CA. Subject of the meeting will be

Strategies for Level 3 Networking in Northern California

Now that the Level 2 Protocol issues have been resolved (and equipment is running, see below) it's time to focus our attention on the next protocol level and come to some kind of group consensus about which way we want to go. I will present some general outlines of the issues and hope to have some feedback from the group. Implementation of a Level 3 protocol here would be a giant step forward for packet radio.

Final planning for the National Packet Conference at the Faire will also take place.

Other News:

The code in the KA6M/R repeater has been revised to accept the new national standards, and it is now back on the air. Bill Danielson and I have had the first QSO using this new code. Thanks to K6EER for the site for now. The hex code for the VADCG beta test version of the protocol is on the computer.

Thanks to the help of Stu Neblett, KA6M** now has a brand new roof mounted antenna. Please send me any comments you might have about signal strength or performance. It's a four element beam pointed at Woody. Should we go to an omni-directional antenna?

See you at the meeting!

TO: HM
FROM: PLR
SENT: 14 FEB 83 03:04:58
READ: 14 FEB 83 04:04:52

To : All Packeteers
From : Paul Rinaldo, W4RI
Subject: FCC Approves AMTOR

Here is the verbatim text of the FCC order authorizing AMTOR. Section 97.69, Digital communications, has been rewritten apparently to clean up the wording. It appears to me that there is a problem in the new paragraph (a)(2) which states that the shift shall be less than 900 Hz. That restriction, while perhaps a reasonable one below 28 MHz, is impractical for sending speeds of 19.6 and 56 kilobauds which are specified speed limits for Baudot, ASCII and AMTOR in paragraph (a)(1). Any fsk modulation scheme that I'm aware of requires a shift (in Hz) of at least 1/2 the data signaling rate (in bauds) for so-called minimum-shift keying (msk). A shift of 83.333% of the baud rate is used in modems such as the Bell 202, and typical PLL demod chips are optimized for this relative shift.

So that leaves us with the fact that (I think) everyone on packet radio in the U.S. (and parts of Canada) uses Bell 202-compatible modems which have 1000-Hz shift. One can read the old paragraph (c) which allows any digital code over 50 MHz and read into it that what we are (virtually all) doing on 2 meters is legal if we regard packetized ASCII as "any digital code" rather than ASCII. Paragraph (c), which was printed in the October 1983 AMRAD Newsletter, restricts only bandwidths not shift nor speed for "any digital code" above 50 MHz.

But below 50 MHz, we can't use "any digital code," and can't use more than 900-Hz shift for Baudot, ASCII or AMTOR. That interpretation would mean that the new wording says that it's now illegal to use a Bell 202 modem with 1000-Hz shift below 50 MHz. A few of us have been on 28-MHz packet radio using Bell 202's for groundwave and skywave tests.

To add to the confusion, we are now forced to interpret packet radio (as we are practicing it in the U.S.) as "ASCII" below 50 MHz and as "any digital code" above 50 MHz in order to obey the rules as now written.

So, I believe that the 900-Hz shift restriction to the three specified codes at the higher speeds may be inadvertent because as I understand the FCC's intent they were hoping to clean up the wording and make the same speed limits apply to all three specified codes. I have discussed this with Perry Williams, W1UED the ARRL Washington Coordinator. Perry suggested that I get in touch with the FCC on Monday, February 14 and see what can be done. (Due to the snow here, that may have to wait a day because Monday has been announced as a "liberal leave" day.) Perry will be here in Washington on Wednesday to discuss it further if necessary. If I can present the case properly, the FCC could issue an "errata" to ease/eliminate the problem caused by the new wording.

73, Paul, W4RI

Federal Communications Commission FCC 83-34
Washington, DC 20554 32667

In the Matter of)
Authorization of the digital code) RM-4122
"AMTOR" for use by stations in the)
Amateur Radio Service.

ORDER

Adopted: January 27, 1983 Released: February 8, 1983

By the Commission: Commissioner Sharp concurring in the result.

Introduction

1. The Commission has before it a petition for rule making, RM-4122, submitted by the American Radio Relay League, Inc. (the League) and received by the Commission on May 26, 1982. The petition requests "... that the Commission amend Section 97.69 of its Rules to permit transmission by amateurs of the digital teleprinter code specified in Recommendation No. 476-2 (1978) of the International Radio Consultative Committee (CCIR), known in the Amateur Radio Service as 'AMTOR,' in the amateur high-frequency bands." 1/ The petition describes AMTOR as "... an automatic request-repeat radioteleprinter system ... developed for the commercial maritime service ..." (and commonly known by the trade name "Sitor" in that service).

2. The League's petition states that AMTOR has the inherent benefit of "... reliable, error-free copy at the receiving teleprinter, and the certainty of the sending operator that the data has been received correctly." A station utilizing the AMTOR code "... transmits data in blocks of three characters, pausing after each to obtain from the receiving station either an acknowledgement or instructions to re-send." According to the League: "The automatic 'handshaking' technique of AMTOR transmissions allows reliable communication even under marginal and fading high-frequency propagation conditions." The two digital codes currently authorized for use in the high-frequency bands, Baudot and ASCII, 2/ do not support this feature.

Discussion

3. In a recent action in the Commission's proceeding dealing with the use of additional digital codes in the Amateur Radio Service, the use of any code was authorized in all amateur frequency bands above 50 MHz. 3/ However, in the Notice of Proposed Rule Making in that proceeding 4/, the Commission did not propose to make such a blanket authorization for the frequencies below 50 MHz in consideration of our international obligations. The Commission, in that Notice, reiterated its concern, expressed in at least one prior proceeding, 5/ that the authorization of any and all codes, on frequencies where international propagation of radio signals is unavoidable, could be a violation of Article 41 of the International Telecommunication Union (ITU) Regulations. That article states, in part, that "... transmissions between amateur stations of different countries ... shall be in plain language." The Commission, therefore, is obligated to consider, on a case-by-case basis, whether a particular digital code is standardized

sufficiently worldwide in order to be considered "plain language." Such findings was made in the proceedings in Docket 20777 when the use of ASCII was authorized.

4. As the League has carefully pointed out in its petition, AMTOR is an internationally recognized code recommendation for the commercial maritime mobile service. Because of this, we believe that it can clearly be characterized as "plain language." Accordingly, we are authorizing the use of the AMTOR code by amateur radio stations operating in the HF bands.

Conclusion

5. We find that good cause exists to dispense with the prior notice and comment procedure provisions of the Administrative Procedure Act (APA) as unnecessary in this proceeding since it is unlikely that any objections would be received in view of the obvious benefits which are being conferred. 6/ 7/ The APA's effective date requirements are also not applicable to these rule amendments because they either relieve a restriction or are interpretative. 8/

6. Accordingly, IT IS ORDERED that, effective on the date of publication of this Order in the Federal Register, Part 97 of the Commission's Rules and Regulations, 47 CFR Part 97, IS AMENDED as set forth in the attached Appendix. IT IS FURTHER ORDERED that RM-4122 IS GRANTED. This action is taken pursuant to authority contained in Sections 4(i) and 303 of the Communications Act of 1934, as amended. Further information on this matter may be obtained by contacting: Steve Lett, (202) 632-4964, Federal Communications Commission, Private Radio Bureau, Washington, DC 20554.

FEDERAL COMMUNICATIONS COMMISSION

William J. Tricarico
Secretary

Attachment: Appendix
:PB

1/ The high frequency (HF) bands are those bands between 3 and 30 MHz.

2/ Baudot is the common name for the International Telegraph Alphabet No. 2. ASCII (American Standard Code for Information Interchange) is defined by the American National Standards Institute (ANSI) Standard X3.4-1968.

3/ See Report and Order in PR Docket No. 81-699, 47 FR 42751, September 29, 1982.

4/ 46 FR 50993, October 16, 1981.

5/ See Third Report and Order in Docket 20777, 45 FR 8990, February 11, 1980.

6/ See 5 U.S.C. 553(b)(3)(B).

7/ Some of the other rule amendments in this action are interpretative and, therefore, exempt from the prior notice and

comment provisions of 5 U.S.C. 553(b)(3)(A). These amendments merely codify our longstanding interpretation that stations operating on frequencies where international propagation is unavilable must not only use codes which are internationally recognizable but also must employ modulation techniques which enable the transmissions to be monitored. In this regard we are explicitly requiring that transmission of all digital codes specified by the Commission be made with frequency shifts of less than 900 hertz. They also clarify the Commission's requirement that radioteleprinter operation be confined to the frequencies where F1 emissions are authorized.

9/ See 5 U.S.C. 553(d).

###

APPENDIX

Part 97 of the Commission's Rules and Regulations, 47 CFR Part 97, is amended as follows:

In Section 97.69, paragraphs (a) and (b) are revised to read as follows:

97.69 Digital Communications.

(a) The use of the digital codes specified in paragraph (b) of this section is permitted on any amateur frequency where F1 is permitted, subject to the following requirements:

(1) The sending speed shall not exceed the following:
(i) 300 baud on frequencies below 28 MHz;
(ii) 1200 baud on frequencies between 28 and 50 MHz;
(iii) 19.6 kilobaud on frequencies between 50 and 220 MHz;
(iv) 56 kilobaud on frequencies above 220 MHz.

(2) When type A2, F1 or F2 emissions are used, the radio or audio frequency shift (the difference between the frequency for the "mark" signal and that for the "space" signal), as appropriate, shall be less than 900 Hz.

(3) When type A2 or F2 emissions are used, the highest fundamental modulating frequency shall be less than 3000 Hz.

(b) Except as provided for in paragraph (c) of this section, only the following digital codes, as specified, may be used:

(1) The International Telegraph Alphabet Number 2 (commonly known as Baudot); provided that transmission shall consist of a single channel, five unit (start-stop) teleprinter code conforming to the International Telegraph Alphabet Number 2 with respect to all leters and numerals (including the slant sign or fraction bar); however, in the "figures" positions not utilized for numerals, special signals may be employed for the remote control of receiving printers, or for other purposes indicated in this section.

(2) The American Standard Code for Information Interchange (commonly known as ASCII); provided that the code shall conform to the American Standard Code for Information Interchange as defined in American National Standards Institute (ANSI) Standard X3.4-1968.

(3) The international Radio Consultative Committee (CCIR) Recommendation 476-2 (commonly known as AMTOR); provided that the code, baud rate and emission timing shall conform to the specifications of CCIR 476-2 (1978) Mode A or Mode B.

Hi Hank,
    I am just getting over the flu. I have not read the mail yet, but wonder if you have a topic for the Feb. meeting, as the mailing date is getting close. Will fill you in on current news tomorrow.
73 & gn -cas-

.po 3

29 Shemokin Drive,
Don Mills, Ont. M3A 3H7
February 12, 1983

Hank Magnuski, KA6M
311 Stanford Avenue
Menlo Park, CA 94025

Dear Hank,

This is in reply to your letter to Paul Rinaldo of June 10, 1981 a copy of which was sent to me and 11 others. It has been a while but I am finally responding to it. Paul has been faithfully distributing such correspondence and I am sending him a copy of this letter so that it may reach those who received your orisinal letter.

When I received your letter from Paul I was heavily involved with the ANIK-B satellite link with Ottawa and the end of that overlapped with my move to Toronto so the reply got pushed way down my priority stack and finally got lost. All these and other considerations have been resolved and I now [illegible] I will be able to become increasingly more involved with Amateur Packet Radio in the future.

The subject of inter-network protocols has become more of a concern to me recently because I have begun work on implementation of a Transmission Control Protocol on my CP/M system and VADCG TNC and a part of this work is the subject of my paper at the forthcoming conference. I have reviewed all my correspondence and I have only been able to find one other response to your request for comments and that was from Stu Beal, VE3MWM whose response dealt mostly with the general philosophy of such protocols and not much with the details. I would be pleased to hear of any other written responses you received, if any. After publishing my suggestion regarding protocols in the proceedings of the first conference, I expected to get some correspondence but I received none so I would not be surprised to hear that Stu's response was the only one you got.

Maybe I can find an excuse for not replying to your letter found in your letter itself. On the bottom of page 2 you say, "...I would like to see some comments on why we shouldn't use it." Well, I think we should use it, so perhaps it could be construed that I should not be commenting. (Please note that this paragraph is intended as humour.)

My protocol suggestion dealt mainly with the Transmission Control Protocol and very little with the Inter-network protocol although the TCP (Transmission Control Program) must interface with the inter-network protocol. I need to implement a TCP which will be able to provide all the information the inter-network protocol requires to function even though the inter-network protocol is only required when information is entering or leaving the network. My hope was to get agreement on a Transmission Control Protocol which would mean that an inter-network protocol would only need to be used when communicating with non-Amateur networks (foreign networks). The agreement on a TCP protocol would allow communication between application programs and permit the application programs using the network to be written.

The development of the Inter-network protocol before anyone has

developed a TC protocol has some dangers. It tends to stress the differences between the networks rather than trying to make them talk to each other. Or, in other words, it tends to create a lot of separate networks rather than one large network. Also, while two users can communicate successfully when they only have a TC protocol, it is not true that they can communicate successfully if they only have an Internet protocol. Here is an analogy that might make the above point a little clearer. Suppose we set up a telephone system so that we could dial up telephones in China - unfortunately we still couldn't communicate because everyone there talks Chinese and everyone here talks English. Maybe my analogy isn't perfect but I hope I made my point. My efforts at developing a TC protocol is like getting everyone to learn Esperanto and the Internet protocol is like trying to get everyone to [illegible] development should come first is a matter of debate. I guess the best of all would be to develop them together at the same time with some kind of an integrated approach. One without the other won't solve the total problem.

Before discussing your proposals I would like to point out an error in the DoD Internet Protocol document that I have discovered. I consider it to be a very significant mistake that may cause some confusion to the readers. In section 2.2 titled, 'Model of Operation' the text says 'The sending application program prepares its data and calls on its local internet module to send that data as a datagram and passes the destination address and other parameters as arguments of the call.' This is incorrect and contradicts statements and the diagram in the immediately preceding section (section 2.1). It also contradicts statements in section 1.3 of the same document. The application level is the highest level and there may be several protocols in between the application level and the internetwork level - such as the TCP. The diagram in 2.1 shows this structure correctly. There never should be direct communication as described between the application layer and the internetwork layer. Section 2.1 says, 'Internet protocol interfaces on one side to the higher level host-to-host protocols and on the other side to the local network protocol.' This is correct. Section 1.3 says "For example, a TCP module would call on the internet module to take a TCP segment (including the TCP header and user data) as the data portion of an internet datagram. The TCP module would provide the addresses and other parameters in the internet header to the internet module as arguments of the call. The internet module would then create an internet datagram and call on the local network interface to transmit the internet datagram." This is also correct and contradicts the statements made in 2.2. Section 2.2 persists in this error and shows the same error in its Figure 2. and also states, "The internet module determines that the datagram is for an application program in this host. It passes the data to the application program in response to a system call, passing the source address and other parameters as results of the call." These statements are also incorrect. I am guessing, but I think the author of section 2.2 was confusing the application programs with the transmission control program. My recommendation is to ignore everything in section 2.2.

I am in very strong agreement with you on all your major points and I would like to even go one major step further and suggest that we also adopt a version of the DoD Transmission Control Protocol. It contains some excellent ideas and suggestions of methods and is very complete. I am planning to make a proposal around this protocol soon in a separate document. Now I will comment on the major points of agreement.

The 'datagram' is the only practical way of providing inter-network

communications. A 'virtual connection' approach is out of the question because some of the networks Amateurs will want to communicate with or through will not be able to provide this facility and also because any packets that have been sent out of one network to another pass beyond control of the originating network. Once out of control of the originating network, it is impossible for that network to make any guarantee as to the sequence of packets that will arrive at the destination or whether they will arrive or whether any indication that they have or have not arrived will be returned to the originator. Please note that the above comments on inter-network datagrams does not apply to intra-network communications. Each network is still free to use either the datagram or virtual connection methods (or even both) for its own internal communications. I am not sure that this latter point is made clear in your letter. I am frequently guilty of confusing this point when I refer to a world wide Amateur Radio Digital Communications Network which will probably turn out to be a large group of networks communicating with each other. (A 'catanet')

I too agree with your proposal, "I propose that AMNET and AMICOM adopt the INTERNET standard intact, with a couple of minor extensions to solve some of our special problems." I have a slightly different idea as to how to solve these recognized problems which I will describe later.

I agree 100% with the several points mentioned in the paragraph headed 'First' on the second page of your letter.

In the next paragraph you say that it would make us compatible with DoD and some other networks to which we might eventually want to interface. This is only partially true because of the extensions you describe. The addressing requirements in the Amateur Radio networks and in the DoD and other networks are different as you say so it is necessary to use a gateway function of some kind when passing between these networks. Admittedly the gateway would have to be more complicated to do this job. This would allow us to pass packets through the DoD network and on to another amateur radio network. This pass-through function is quite a bit different from actually communicating with the hosts and users in the DoD network itself because that would require compatibility at the higher levels of protocol such as the Transmission Control Protocol. By providing a very simple bidirectional gateway function the amateur radio networks could reciprocally provide a pass-through function between two DoD networks as well. Both could provide a service for the other with no requirement of any knowledge of any higher level of protocol than the internet protocol. The gateway would have to have knowledge of the addresses in both networks.

I agree with all the points raised in the paragraph which starts, 'Third' on the second page. The INTERNET document is one which we can build on. We both agree there are some changes required but the document is the best that we have available at the present time describing an internet protocol.

I also agree with all the points raised in the last paragraph on the same page where you bring up the question of Transmission Control Protocols. This is of course an entirely different subject which opens up a whole new set of considerations. I will be preparing another document on TC Protocols which will hopefully get more feedback than my last one.

On the third page you discuss the problems in applying the INTERNET standard to the Amateur Radio environment. I agree 100% with your

identification of these problems in the area of addressing. The Amateur Radio environment must use call signs as at least part of the internet addressing/naming structure. I would like to propose a slightly different solution however.

The addressing structure you proposed has four components:

1. A single byte field containing a zero field or a constant for all the Amateur Radio networks.

2. A two byte field representing a geographic location to the nearest degree of latitude and longitude.

3. A one byte field assigned to each station in an area presumably assigned by a higher level of protocol or by committee.

4. A six-byte field containing the call sign of the station.

I propose an address structure with three components:
1. A six-byte field containing the call sign of the station similar to number 4 above.

2. A one byte ASCII field normally blank (20H) but will be used to represent different connections to the network by the same station. To quote the Internet Protocol document, "Care must be taken in mapping internet addresses to local net addresses; a single physical host must be able to act as if it were several distinct hosts to the extent of using several distinct internet addresses." Alternate physical and logical connections can be identified by changing this to another ASCII character or number. It can be looked upon as being part of the call sign for convenience for example: VE7APU1, VE7APU2, etc. A multi-homing feature can also be provided by ignoring this byte. I am not sure if this is what you intended by item #3 above.

3. A field representing the network or area that the station is in. The length of this field will be determined by the method of representation chosen as follows. (Choose only one.)

3.1. A one-byte network number chosen by committee. I would expect [illegible] amateur radio networks would be enough for some time to come out.

3.2. A two-byte network number chosen by committee. This certainly would be enough for as far as I can see into the future.

3.3. A two-byte network number based on the geographical partitioning method described in your letter.

3.4. A three byte ASCII network name such as 'TOR' for Toronto or 'LAX' for Los Angeles. Something like airport naming. It may be used to identify foreign networks as well as areas or domains in the Amateur Radio network.

By giving a choice, I don't mean to leave everyone free to choose which one he wants to use. One of them should be chosen as a standard. I can live with any of them but I have a personal preference for choice 3.4 for the following reasons:

1. It's consistent with the other part of the address being a name that is readily understood by the end user of the system as is the call sign. It is very user friendly.

2. It will not require a look up table or directory on the part of the end user to make use of it as choices 1,2 and 3 will require.

3. I don't think that the internetwork naming and addressing is the proper place for routing information to be placed. In this respect I feel that we should not change the DoD Standard Internet Protocol. The routing system should be handled by another level of protocol and another mechanism. In the case of the DoD protocol standard it states that, "It is the task of lower level (i.e., local net or gateways) procedures to make the mappings from local net addresses to routes." The document does not deal with routing. I think the question to be asked is, 'Who are these fields going to be made convenient for - the user of the computer?' I think they should be made for the user. There are a number of other mechanisms that will work for routing.

The document states, "A distinction is made between names, addresses, and routes. A name indicates what we seek. An address indicates where it is. A route indicates how to get there. The internet protocol deals mainly with addresses. It is the task of higher level (i.e., host-to-host or application) protocols to make the mappings from names to addresses." As you will observe, neither of our proposals to solve the addressing problem pays strict attention to this discrimination. My solution uses names as addresses and so eliminates the need for higher level protocols to map names to addresses. This makes the 'addresses' longer however. The reason why I chose this way is because I thought as hard as I could and could not think of a practical way for separate networks to implement a mechanism whereby the names we need to use could be mapped to addresses. I assume that you did the same and came up with a similar conclusion judging by your proposal. The problem is that the call signs are so very important in the Amateur Radio environment but at the same time, they are too randomly assigned and numerous. So I am taking the easy way out and calling them addresses.

To go back to the discussion of address compatibility and gateways. The addresses in one network are not compatible with those in another network just because they occupy the same number of bytes. In my proposal the addresses are obviously not the same length as those in the DoD network. Likewise in your proposal, the addresses are not the same length. You have hidden part of the address in the options field. I think the test for what part is an address is the answer to the question, "What parts of the header do I need to set the datagram to the destination host?" If you say the call sign is not part of the address because all the information is in the four byte field using the last byte to represent the call sign then the next obvious question is, "What mechanism is there for the source to learn the destination's four byte address without first using the call sign field to deliver the first datagram to the destination?"

The other problem is mapping the names to routes. There are a number of ways to do this. When the packet enters the network, the gateway can have a table mapping the names to routes. It only needs to map the three byte network/domain name to a route at this time because the call sign can be mapped when the datagram arrives at the destination network, area, or domain. In some situations it may not be necessary to map the call sign to a route at all. It may be sufficient to just broadcast the datagram in the local area where the destination will be able to hear it. This mapping task in many cases may be much simpler than it sounds depending on how the various areas of the network are linked together. For example in many cases there will be only one

direction in which it is possible to transmit data so no mappins has to be done. So the datasram may be passed automatically alons to where the mappins actually has to be performed. In other cases it will only have to be determined whether the datasram is for this area or some other area to decide whether to send it alons or broadcast it locally. When a true mappins node is required it could insert routins information into the option field for this purpose. Very little route mappins will have to be done in actual fact until the time the network becomes extensive.

Even if two networks have the same lensth address fields and even if these fields contain sufficient information to set the datasrams to their destinations within each network, this still is not sufficient for compatability. Both networks must be able to understand the other address in order to be compatible. I will try to illustrate this usins your four byte address scheme and a hypothetical situation where the Amateur network or networks is usins the Arpanet to provide a pass-throush facility between San Francisco and Washinston, D.C. A datasram orisinatins in San Francisco needs to be passed throush the Amateur network in the San Francisco area, then into the Arpanet, throush the Arpanet to the Washinston, D.C. area, out of Arpanet and into the Amateur network in the Washinston area and finally throush the Amateur network to its destination in the Washinston area. Usins your address scheme everythins will so fine until the Arpanet tries to move the datasram throush its network. I don't know how the Arpanet determines routes from addresses but I am pretty sure it will have no way of handlins the two bytes that represent seosraphic location to the nearest one desree. The one byte network address won't help any either even if [illegible] to an amateur radio network. To do this they will have to change the software in all the hosts in Arpanet and add code so they will understand the Amateur network addressing structure. The reverse situation is also true, the Amateur network does not understand the Arpanet addresses. The only practical solution to this problem is the use of a sateway as the internetwork protocol was intended to be used. The gateway has the ability to translate between the Amateur network addresses and the Arpanet network addresses - not necessarily all addresses but the ones we need to use. Makins the addresses the same lensth in both networks doesn't really make this mappins process any easier. In fact it may make it more difficult because a four byte address may not be the most convenient lensth for the Amateur network. Please excuse me for perhaps belabourins the issue of compatability but it was suggested as one of the major reasons why we should adopt this protocol.

The Amateur radio network environment is unique. I think Stu Besl's observation when he quotes Kleinrock is very appropriate:

> "In our experiments ... we have occasionally attempted to adopt a protocol from one network directly over into a new network. We have found that this is a dangerous procedure and must be carefully analyzed and measured before one adopts such a procedure. Indeed, the use of old protocols in a new environment is dangerous." (Kleinrock, op cit)

It looks like Stu has come up with a maxim for Amateur packet radio, "Adapt not adopt." It may be that we are doins too much adoption and not enoush adaption in dealins with the DoD Internetwork protocol.

I think that intra-network routins should be the responsibility of the network concerned. In other words, when a packet from another network arrives at a destination network, that network should be able to deliver the packet to its destination usins only the call sisn in the

internetwork header to direct it. The network I am working on uses a station node and will certainly be able to do this job and will also be able to send a message back if it cannot be delivered. However in the case where there is no real network, the internetwork packet can just be broadcast by the repeater represented by the network name, the station it is intended for will hear its call sign and respond. In this case however, no negative response will be provided if the station is not present to respond. (In true datagram fashion.)

To provide inter-network routing on the other hand, requires some kind of universal system that has to be agreed upon by the various networks to work. What that mechanism should be requires a major effort at agreement and should be the subject of a separate proposal. The alternative is the use of gateways.

I think I have commented on two of the four components of your proposal for addressing. The one byte network number field that is either zero or a constant yet to be assigned by the DoD I feel is entirely unnecessary and would only be of concern to the gateway function that interfaces with the DoD network. It is only useful while the packet is actually passing through the foreign network and in fact all four bytes in the destination and source addresses will have to conform to the other network's standards while the packet is being handled by the DoD or other foreign network, i.e. this means the packet has been transformed by the gateway function. While it is on 'our' side of the gateway, this field is of no use.

In reference to the low order eight bits that will be assigned to stations in the same area: I feel that this one byte field is just a [illegible] of referring to the call sign field and so is redundant. The call sign uniquely defines the destination of the internet packet and is already present. The use of a shorthand form for the call sign has its uses in certain cases in intra-network communication however and [illegible] I am working on will allow mapping of call signs to single [illegible] addresses to use as link level addresses and shorten packet [illegible] to 10 bytes. But this function is not for the inter-network [illegible] It should be kept a local matter in each network interface.

As to the format of the internet header: My proposal is to expand the source and destination addresses from four bytes to ten bytes each. (Assuming you use my preferred choice for the network address- otherwise, nine or eight bytes.) and change the version number from 4 to 5 for example. Now here's what happens when the packet is passed through the DoD network which needs a version 4 header.

[illegible] The gateway node takes the 10 byte Amateur network source address and puts it in the option field, it takes the 10 byte Amateur network destination address and puts it in the option field, changes the lengths of the address fields to four bytes and inserts the DoD network source address and the DoD destination address information and finally changes the version number to 4. The version 4 packet is passed through the DoD network to its destination which is another gateway to an Amateur Radio network. This gateway transforms the version 4 packet back to version 5 by getting the information from the option fields and the packet is passed through the amateur radio network to its final destination with no one the wiser as to what happened. The transformation is a very simple matter. Whether or not the transformation is necessary, the gateway is still necessary to interface to the foreign network because knowledge of the addressing system of the foreign network must be kept somewhere and I don't think that users of the pass through facility should be required to have this knowledge. Also, some kind of physical

interface is required as well.

You sussest reducins the complexity of the INTERNET standard by restrictins the use of the frasmentation feature and you say,"The standard specifies a 576 byte maximum packet size." Actually the standard specifies that 576 bytes is the recommended minimum datasram size that will be accepted by a destination host. The maximum datasram size is 65,535 bytes. The standard recommends that datasrams larser than the minimum only be sent when it is known that the destination can handle them. This is only an asreement between source and destination and the implication is that all networks will be able to handle datasrams up to the maximum size either whole or by frasmentins them. In section 3.2 of the specification after the headins, 'Frasmentation and Reassembly," it says, "Every internet module must be able to forward a datasram of 68 octets without further frasmentation." This implies that the network should not have to frasment a datasram unless it is over 68 bytes long. The LANs we are using now meet this requirement because they handle packets as lons as 250 bytes without frasmentation. I would agree with you however proposal on bits saved if it weren't for the possibility of the reverse situation occurrins. You are mainly concerned with the Amateur networks makins use of other networks such as the DoD network. What about the reverse situation where the DoD network wants to use the Amateur network? In this case our network would be receivins 576 byte packets destined for Amateur Radio hosts and potentially datasrams up to the maximum of 65,535 octets if the destination host is prepared to accept them. (see section 3.1 of the standard after the headins, 'Total Lensth:') The possibility exists that both source and destination hosts are in non-Amateur networks and two Amateur Radio networks is considered used for pass-through. We would not have any control over the datasram size in this case. I think we'd better leave the frasmentation feature as it is if we want to interface with non-Amateur networks and advise all hosts to be able to handle datasrams up to 576 bytes. If you envision the situation where the source is in an Amateur network and the Destination is in a non-Amateur network or vice versa.

As far as the Service Type, Security Option, Stream ID, and Timestamps I asree that we do not need them but we must make provision for them in the sateway because packets comins out of the foreisn networks we are usins may require them even thoush we don't. We should make the gateway store these in the options when a packet comes into the Amateur network and return them to their proper location when leavins the Amateur network again. We can create our own option numbers for this. I think the possibility of reciprocal use of other networks for pass throush purposes should be maintained even thoush we may not be able to see the possibility immediately. For example, what if the DoD wanted to test the Amateur Radio network for possible use durins an emersency situation? We wouldn't want them to lose their security information or to have our network refuse to deliver their 10,000 byte datasram or would we?

Some of the above comments are elicited by your own statement that we may want to interface with some already existing networks. I see mainly concerned with an Amateur network and I don't know how serious you are about usins these other networks or what the possibilities really are but if you are really serious about it, we will have to make provisions for support for all the fields in the standard even if we don't use them ourselves for the benefit of these other networks. The full interfacins of these other networks to ours where we can access all the users and functions of a non-amateur network is not a trivial matter and requires analysis of all levels of protocol used in both systems and

may prove to be impossible in some cases even with extremely complicated gateways. This is why I have mainly limited my responses to the use of these networks for pass through purposes. Your letter does not clearly explain the type of interface you envision.

Let me become philosophical for a moment. My orisinal idea when I became involved with Amateur Radio Disital Communications was the creation of a remote Amateur Radio Disital Communications network developed by Amateurs and for Amateurs usins techniques and protocols tied directly to the needs of Hams. Unfortunately or fortunately, dependins on your point of view, this pure ideal has not proven to be very popular. Many are concerned with interfacins or makins the Amateur Radio network compatible with other existins networks. Interoperability has become a major desire expressed by many. In my opinion, by soins this route, we are openins a larse bas of snakes and limitins our potential at the same time. As for an Internetwork protocol, I think Amateur Radio needs to have one but at the same time I hope we never have to use it except for communication with a non-Amateur network. I can still hope even if I don't expect.

Finally, I would like to say that although I have some different proposals I don't consider them to be major objections to your own proposal for Amateur Radio's Inter-network standard. In fact, in the spirit of compromise, and at your insistence, I will asree to your original proposal in all details even though I don't think they may be the best solution. So there you have it, total asreement on your proposal if you want it. I only hope that you might after careful consideration see fit to adopt maybe one or another of my differins ideas expressed above. And now, since we have come to an asreement, maybe we can set some other sroup to asree on your proposal as well.

73 for now. I'll see you at the Conference in March.

Doug Lockhart, VE7APU/3

TO: HM
FROM: PLR
SENT: 12 FEB 83 00:34:52
READ: 12 FEB 83 02:13:13

HANK,

1. THANKS FOR THE EARLY CODE RELEASE. WE ARE IN A HURRY HERE DUE TO ERIC SCACE. HE HAS ALLOWED THAT WE MAY PLACE A REPEATER ON HIS MOUNTAIN SIDE. WE HAVE CONSTRUCTED A VANCOUVER REPEATER BOX USING THE STD COMPUTER BOX AND RADIO AND POWER SUPPLY, ETC. IT IS READY TO GO WITH 100 WATT AMP (THINK WB5MMB,SANDY SETTING IT AT 50W TO BE CONSERVATIVE) AS SOON AS ERIC RETURNS FROM TRIP. THE PROBLEM IS THAT ERIC TRAVELS ALL OVER THE WORLD WORKING ON PROTOCOL SPECS LIKE AX.25. HE IS HOME IN SMALL WINDOWS AND MUST BE READY FOR HIS NEXT WINDOW IN ABOUT ONE WEEK. OUR PLAN IS THAT TERRY HAS IDENTIFIED CHANGES TO AMRAD REPEATER CODE THAT RUNS ON VANCOUVER BOARD. I WILL TAKE THIS CODE AND BURN IT AND COMMENCE TESTING. WE DO NOT WANT TO PUT OLD VANCOUVER CODE ON THE MOUNTAIN AND WE DO NOT WANT TO MAKE FREQUENT TRIPS UP THERE EITHER, SINCE ERIC IS HOME IN THESE SMALL WINDOWS. THINK HE IS IN GENEVA AS I TYPE.

2. AS SOON AS TERRY AND I TEST THE NEW REPEATER CODE, I WILL STUFF IT ON THE WIRE TO YOU. THINK THE CHANGES ARE MINOR AND YOU COULD PROBABLY DO THEM YOURSELF IN A JIFFY, BUT TERRY IS ACTIVATED FOR CODING.

3. I WILL ADMONISH TROOPS CONCERNING AMSAT DONATION. WE ARE KIND OF DOWN ON AMSAT DONATIONS AS A CLUB SINCE THE FAMOUS MODEM DEAL. I VERBALLY CONTRACTED WITH THIS AMSAT TYPE IN NEW JERSEY TO PURCHASE TWO MODEMS FOR $25 EACH. HE SAID FINE AND WENT OFF AND GOT THE MODEMS. WHEN I FINALLY SAW THE MODEMS ONE MONTH LATER, THE PRICE WAS NOW $55:
MODEM-$25
AMSAT DONATION-$25
DONATION TO NJ CLUB-$5
THIS REALLY MADE ME MAD SINCE I THOUGHT HE WOULD HONOR THE VERBAL DEAL MADE ONE MONTH EARLIER, BEING AN HONORABLE PACKET BUDDY ETC. WRONG. TOM CLARK AND RIP CONVINCED HIM TO ADD THE $25 AND HE ADDED THE EXTRA $5 FOR GOOD MEASURE. I PAID THE CASH AND LEFT WITH THE TWO MODEMS. WOW, WAS I DOWN ON AMSAT. YOU HOWEVER HAD NOTHING TO DO WITH THAT SOUR DEAL AND HAVE DONE A MONUMENTAL CODE EFFORT HERE. IF YOU WANT US TO DONATE TO AMSAT, WE WILL. I HOPE PHASE III GOES OK.

4. I WILL TRY TO GET THIS BURNED SOONEST. WE ARE SNOWED IN HERE. MY GARBAGE CANS ARE COVERED. IT IS STILL SNOWING. PREDICTION IS 20 INCHES, NOW HAVE ABOUT 12. BEST POSSIBLE CASE FOR MICRO CODING AND PACKET WORK, BUT I HAVE WORK TO DO AT WORK SO BY MONDAY IT BETTER SHAPE UP. GUESS YOU NEVER HAVE THESE TROUBLES IN SUNNY SAN FRAN HUH?

73,DAVE,K8MMO

TO: HM
FROM: PLR
SENT: 11 FEB 83 22:51:20
READ: 12 FEB 83 02:12:34

Dear Hank,

Please let me know as soon as possible about the recommended hotel(s) for people coming to the Faire/packet conference. Several people have asked me. When you reply, I suggest that you send copies to other other packeteers on PRNET.

Would you please make a reservation for me? I haven't booked my flight yet but plan to arrive there on Thursday, March 17 then leave on the red eye late Sunday, March 20.

Conference papers are coming in one by one. Unless you disagree, I am planning to air express the camera-ready originals to you on or about Friday, March 4. Assuming that you get them on March 7, that gives your printer about seven working days to reproduce and bind them. (Just to play it safe, I'll be sure to Xerox all originals before I let loose of them.)

Incidentally, in addition to the authors I mentioned earlier, I have a paper on SOFTNET by Jens Zander/Robert Forchheimer and "A Block-Oriented Interface for CP/M and the VADCG TNC" by Doug Lockhart.

I'm getting inquiries from people who cannot attend but want copies of the proceedings. Shall I tell them to send you a check for nine dollars per copy (eight for the book, one for postage)?

73, Paul, W4RI

To: Packeteers
From: Bill Danielson, N6FOR
Subject: Downloading of VADCG board

I have modified my VADCG board to be downloadable. The modification is upward compatible in the software sense, that is, the current TIP/LIPM software HEX files will run as is. The board contains 16K bytes of RAM usable for program/data.

I also added a counter that interrupts the CPU every 1/1200 of a second. To maintain compatibility with the current VADCG board, this interrupt is hardware disabled when the board is booted and must be enabled by an OUTPUT instruction. The idea here was to use it to do such things as force out data in host mode, etc.

Downloading works as follows: When booted the EPROM resides at location 0000-07FF and there is RAM at 8000-87FF. The rest of the RAM resides in its normal locations, that is, 0800-3FFF. The hardware is set up so that if the VADCG issues a certain OUTPUT instruction, the RAM and EPROM exchange places. From then on, the address space is:

0000 - 3FFF -- 16K of RAM (consisting of 8 6116s)

8000 - 87FF -- 2K EPROM for downloading and future use (2716)

Since the current TIP/LIPM software all executes in locations 0-1FFF, the board maintains compatibility with current software.

The format of the data to be downloaded is Intel Hex format. The file is currently sent over the RS-232-C port. The downloading protocol could be easily changed to make it use any format that was desired. One could even forsee downloading via the network. This would allow this modification to be useful to those who do not currently own a computer to do the downloading.

I will try to have more details, schematics, etc, ready by the next meeting. Briefly, you throw away your 2708s and 2114s (anyone need some to build their board?) and replace them with a 2716 and 8 6116s. 3 additional MSI LS TTL chips are needed (LS74, LS153, and LS193). The only part of the modification that I am concerned about is the use of the OUTPUT ports. I'd like to talk to an 8085 hardware expert about this at the next meeting.

PRD N6FOR

P.S to Hank -- if you want another station to aid in your debugging of the new protocol implementation, let me know. What I would need would be a HEX file containing the new code or source files which I can assemble (I don't have MAC assembler though, so I would need 6 character label names).

TO: HM
FROM: DML
SENT: 06 FEB 83 22:12:15
READ: 07 FEB 83 07:27:16

To : Paul Rinaldo, W4RI

Info : John Strassa, VE7ADE
: Hank Magnuski, KA6M
: Dan Connors, KD2S/Lyle Johnson, WA7GXD

Subject: Pre-frame sync, etc.

Dear Paul,

To my knowledge, the 8273 is the only one of the three chips you are concerned with that automatically generates the pre-frame synchronization transitions. This feature is very convenient. On the other hand, all three of the chips offer direct control of the bit stream being sent out in some form or another. This direct control of the bit stream is not very convenient to use mainly because it requires extra software to drive. I would expect that both the WD-1933 and the Zilog 8530 would be able to simulate the automatic operation of the Intel 8273 with appropriate software.

All the chips operate in flag stream mode as well so they all can be made to send any number of flags before the block. The easiest way to do that is by adjusting the clear to send delay on the modem. The 16 reversals is more efficient because it gives the modem more transitions to synchronize on. With bit-oriented protocols, as we are using, the modem only has to do bit synchronization - not byte synchronization. The synchronization that Karl is referring to in his article is 'byte' synchronization which the chips we are doing performs automatically. Karl is confused. He thinks that the 'flag' being used in bit oriented protocols is a 'sync vector' that the modem needs to see in order to provide correct clocking to the digital circuitry and so he has become very concerned over the identification of this particular bit pattern. He also appears to think that this pattern might occur accidentally in the data stream and cause trouble. Neither of these is the case. With bit-oriented protocols, the only thing the modem need be concerned with is providing a clock tied to the data transitions. The fact that a 'flag' may occur with random garbage coming in on the data line is of no concern to us since the 8273 and others will only give us a packet if it is bounded by flags at either end and has a valid CRC-16. The 'flag' bit string can never occur in the data no matter what random data we send out because the chip uses a bit-stuffing technique.

I am afraid that Karl's article will spread more confusion in any area where there is already plenty. His sections on 'Sync-vector requirements' and 'Formats for Coded Transmission' contain information which don't apply to X-25 or our system but because of his mention of the "flag" byte and X-25 in the section 'Sync-vector requirements' make it appear that it does. Furthermore, the mention of the adoption of AX.25 in the Introduction

is incorrect and I strongly disagree with some of the conclusions in the section titled, 'Conclusions'. He has a right to his

opinion however.

In reference to Karl Meinzer's article, I agree 100% with Hank's 5 itemized comments and I have some additional comments.

1. I fought the battle of fixed length versus variable length packets back in 1979. Karl's conclusion that we should adopt a fixed block length for packets seems to fly in the face of all the progress we have made to date. While Karl's system for control of the satellite may have been very effective the fact is that in a general use data communications network we usually do not have 512 bytes (the number Karl used) to send at a time. Of what use is a 512 byte packet when we only want to send a carriage return character? We have already solved the problem of data transparency as Hank has pointed out. I don't want to review the entire issue here but I will make the following statement albeit unsubstantiated in this note: There are both disadvantages and advantages to both fixed and variable length packets but for the general use Amateur Packet Radio network the advantages of variable length packets outweigh those of fixed length packets.

2. The use of Forward Error Correction (FEC). There are three types of communication paths that Amateurs will likely be using for packet communication in the future, namely VHF/UHF, HF and Satellite. My best guess is that as the future unfolds the VHF/UHF terrestrial usage will predominate.

A. VHF/UHF paths are characterized usually by having either a good signal or no usable signal at all. In this environment FEC requires additional overhead and provides no benefit whatsoever. A retransmission scheme for error correction is being used now which has proved to be efficient. The chips and equipment that we are using now do not have any provision for FEC in any case.

B. HF paths used by Amateurs are so subject to disruption that I expect that they will never be widely used for communications requiring data integrity. It is true that commercially, HF channels are used for this purpose but the techniques used commercially are normally not available for the Amateur for both technical reasons and also because Amateur regulations do not permit their use. In addition to the unreliable channels, Amateur channels are not protected and so even when conditions are optimal, communications may be disrupted by QRM. Commercial usage is usually not troubled by this latter problem. In this environment FEC would only be useful when the propagation conditions were right and there was no QRM on the channel. As Karl says FEC doubles or triples the overhead and so it increases the chance of the packet being hit by QRM and Rayleigh fading. It is also only effective when a maximum of about 2 to 3 percent of the bits are lost. Note that it always has to be backed up by a retransmission system in any case to recover packets that the FEC system didn't handle. Let's look at the situations when FEC is of no use:

When signals are so weak that no communication is possible.
When a packet comes through perfectly with no errors.

When fading wipes out more than 3% of the packet.
When QRM wipes out more than 3% of the packet.

With a system using retransmissions alone, the same packet could be transmitted 2 or 3 times in the period that it would take the FEC packet. I would suggest using shorter packets for the HF channels rather than FEC. The AMTOR system uses this method on HF. When the channel is clear, the retransmission system will outperform the FEC system.

C. Satellite paths are more like the VHF/UHF situation where there is a solid signal or no signal, but the signal is not quite as reliable. Retransmissions are likely to be required because of packet collisions but FEC would not help here because a collision would likely wipe out more than 3% of a packet and FEC would automatically cause an overhead increase of 100 to 200% on every packet.

I don't know much about the AX-25 protocol yet but I am awaiting your Level 1 document. I am a little concerned over the name of the standard because it sounds a little like the X-25 commercial standard which I studied to see if it was applicable to the Amateur Radio Packet environment in 1979 as well. I concluded that it was unsuitable but had a few good ideas in it. I don't think that any standard for Amateur Radio could come from the X-25 protocol. Even if some ideas come from the protocol, it will have to be quite a bit different from X-25 and so shouldn't be named after it. I think more and better ideas are found in the DoD Transmission Control Protocol document that you provided me than in X-25.

Karl's statement about the "... recent adoption of the AX.25 standard for radio-amateur packet radio..." is quite a bit premature in my opinion. I have not had an opportunity yet to review it and I would not like to see any protocol adopted until it was implemented first - even my own proposal which was published in 1981. There are many problems with protocols which only show up after they are tried out in real conditions. To my knowledge the only agreement made among the various groups was to use the HDLC/SDLC frame and FCS, bit oriented protocols and variable length packets. As yet, there has been no agreement as to the layout of the data contained in the frame or in the address or even the control field to my knowledge.

73, Doug, VE7APU/3

To : All Interested Packeteers
From: Curtis, N6ECT
Date: Feburary 2, 1983

Subject: Calls Logged Packet Central January

There were 151 CALLS LOGGED on the DG in January
59 CALLS via PHONE &
92 CALLS via PACKET RADIO

Those active were: N6ECT KD6LI W6JHJ WA6TAT VE7CYD AA4KB
KA6NAN WA6JFZ K6VCO WB6KTN WB2GDQ N6FQR
N6GJH KA6ETJ W6XN WA6AZP W6RAW

To : All Interested Packeteers
From: Curtis, N6ECT
Date: January 31, 1983

Subject: Year Report on CALLS.LOGGED 1982

	CALLS LOGGED PACKET RADIO	CALLS LOGGED TELEPHONE	CALLS LOGGED TOTAL
JAN	268	133	401
FEB	274	62	336
MAR	252	82	334
APR	109	88	197
MAY	174	131	305
JUN	110	89	199
JUL	94	83	177
AUG	48	69	117
SEP	41	22	63
OCT	56	52	108
NOV	49	59	108
DEC	47	62	109
YEAR	1522	932	2454

The followins stations/individuals participated:

WB2GDQ	KA6NAN	WA6SLF	WA6RZW	WB2CAM	KA6ETJ	WB6SDE	WA6JFZ	WA6AZP
WB6KTN	WB2HUT	WB6HJF	KA2BQE	VE7CYD	WB6WBK	WB6YMH	AA4KB	N6ECT
W6RAW	W6JHJ	K6VCO	N6HRN	KB6WP	KA1AS	KD6SU	N6CKV	N6GJH
KD6LI	N6FQR	N6BOH	N6FTZ	K6HWJ	W6OCP	W6LLO	W6FFC	K6HSV
W9UHK	KA6M	KA9Q	W6CB	AD7I	KD6R	KN6W	W6BB	NJ6A
W6XN	GNU							

To : All Interested Packeteers
From: Curtis, N6ECT
Date: January 1, 1983

Subject: Calls Logged Packet Central December

There were 109 CALLS LOGGED on the DG in December
62 CALLS via PHONE &
47 CALLS via PACKET RADIO

Those active were: N6ECT KD6SU WB6SDE KA1AS KD6LI W6JHJ
KA6NAN WA6JFZ K6VCO WB6KTN WB2GDQ N6FQR
N6GJH KA6ETJ GNU W6XN WA6AZP N6HRN

To: Paul Rinaldo
Fm: H Masnuski, KA6M

SJ: HDLC Sync-vectors and Pre-frame sync

Comments on Karl's article --

1. Four bytes of pre-frame sync is an entirely different thing from four bytes of sync vector. What Karl is advocating, in effect, is that the HDLC chip must receive four contiguous flags before it decides that a frame is truly arriving. I don't know of any way to make our HDLC chips go into start-of-frame mode on more than one flag.

2. If the data link is so bad that a lot of false syncing is expected, then I think we're going to have some serious problems getting any data through at all. If the receiver has started receiving a false packet at the very beginning of a transmission, only one properly received flag is required to scratch the false packet and start anew. There is no chance of missing a flag and its subsequent packet because you happen to be in the wrong byte-sync at the time the flag flies by.

3. Preframe sync of a zero pattern can technically cause false packets to be detected. The pattern FLAG-ZERO FILL-ZERO FILL- ... -FLAG will be interpreted as a frame with a bad FCS by most hardware. I know, as my repeater was tripping up on the packet stream being sent out by the VADCG TNC in the early days of trying to make the two talk to each other. Filler FLAGS do not cause this problem (which is small but annoying).

4. HDLC inherently provides for sending transparent data, and fixed block coding offers absolutely no advantage in that area.

5. I don't recall any agreement to adopt X.25 or AX.25. The use of those terms to describe what we have adopted is misleading.

73, Hank

TO: HM
FROM: PLR
SENT: 31 JAN 83 15:40:57
READ: 01 FEB 83 06:06:52

To : Den Connors, KD2S
Hank Magnuski, KA6M

Info : Doug Lockhart, VE7APU
John Spragg, VE7ADE
Tom Clark, W3IWI

Subject: Level 1 Considerations

Yesterday, I sent you (except for W3IWI) a message discussing pre-frame sync in order to solicit what you know about the feasibility of implementing two octets of bit reversals on the WD-1933 ahead of the initial flag of the frame.

No sooner was that dispatched when the incomming mail brought a manuscript for QEX from Karl Meinzer, DJ4ZC. In it he makes a case for 4 (rather than 2) octets of pre-frame sync. He also has a number of other well-received points which I will certainly incorporate in the Level 1 document to the extent possible. So, Karl's input is timely and much appreciated.

Karl's article doesn't change my question (can the WD-1933 produce reversal-type pre-frame sync, albeit 2 or 4 octets). However, I thought that you'd like to have benefit of Karl's thoughts at this time. So attached is a preview of what will be published in QEX 14 (March) and not for reproduction until it appears in QEX! (I hope that I can also include Den's bibliography on msk in the same issue so it'll be a good issue for the March 19 packet conference.)

73, Paul, W4RI

(Attachment)

Packet Radio and Radiocommunication Requirements

By Karl Meinzer, DJ4ZC

Introduction

The recent adoption of the AX.25 [1] standard for radio-amateur packet radio has been a significant milestone towards a more widespread use of digital communication. So far efforts concentrated on the digital and logical requirements of this new form of communication. Adopting essentially the existing X.25 standard has some potential problems, though, when facing the realities of Amateur Radio. The X.25 standard had been designed for the "good" communication links normally used in the commercial environment. With amateur signals often fading into the noise and with QRM being quite frequent, the AX.25 standard may be less than ideal.

Sync-Vector Requirements

When the author developed the AMSAT Phase III digital communication techniques, a blocked format was found to present the best overall properties. This means that each valid

transmission consists of a block of constant length (512 bytes with Phase III), and in between these blocks some idle characters are being sent. The satellite uses synchronous transmission; this means that no start and stop bits are used and that the data stream is continuous. There are a number of ways to recover the bit clock; in the case of Phase III biphase encoding of the data was adopted to simplify the process on the ground.

Synchronous communication has many advantages over the older nonsynchronous forms. The data rate is effectively 20% higher. More important, though, is the possibility to use more modern modulation techniques having considerably better weak-signal performance.

Because of the continuous nature of the data stream it becomes necessary to identify the beginning of the individual bytes and the entire block of valid data. When the signal/noise ratio is good and data errors are an infrequent occurrence, the recognition of one particular byte in the data stream usually is sufficient to get this information. Most of the ICs commercially available for synchronous communication thus provide the capability for recognizing 1 or 2 bytes as the so-called "sync vector"; and the X.25 standard also uses the "flag" byte for this purpose.

If the link performance may get very poor temporarily, e.g., in space communication or with Amateur Radio, one or two bytes for synchronization are not adequate. In this environment it makes sense to require that sync (the beginning of a block) is declared only if the block start is positively identified. If the receiver is just getting noise, the modem will output random data, and the probability of this random data declaring "sync" should be reasonably small to prevent this false sync masking the real sync vector possibly coming a little later. (This assumes that no squelch can be utilized in the receiver -- the are no practical ways to design an effective squelch with the better communication modes requiring low signal levels.)

The time between declaration of false sync on random data is t = 2^n/data rate, n being the length of the sync vector in bits. With n = 8 every 256 bits (about once every 1/4 second at 1000 bit/s) a false sync is declared. Even with a sync vector of 16 bits long (2 bytes) about once per minute a false sync will be "recognized." Because of this problem AMSAT adopted a 4-byte sync vector for the Phase III satellites. NASA also uses 4-byte vectors in their telemetry transmission. With the 4-byte vector the probability of false sync is so low that only every 50 days or so a false sync will occur. Since at the end of the block a CRC normally will be used to identify errors, this performance is quite satisfactory.

Modulation Formats

Most high-performance data transmission systems use some form of phase-shift keying (psk) because these modulation systems offer excellent Eb/No performance for vhf and uhf data transmission. The receiver for these formats must reconstruct carrier and bit-rate phase and frequency for proper operation. This reference information then is used by the circuitry to demodulate the received data.

It should be noted that the quality (absence of phase jitter)

of the reconstructed carrier determines if the theoretical predictions as to the Eb/No performance can be obtained. Without going into the mathematics it can be stated here that for 2-phase modulation formats the effective two-sided bandwidth of the carrier-recovery PLL should not exceed the data rate/4. With 4-phase techniques (e.g., qpsk or msk) this PLL bandwidth must be reduced to the data rate/100. (With 2-phase systems the signal degradation is proportional to the cosine of the phase error; with 4-phase systems the degradation results from quadrature-channel crosstalk proportional to the sine of the phase error.)

The loop bandwidth determines the time required for the receiver PLL to become locked after the transmitter is keyed on. A very careful PLL design is necessary in order to make this time to lock short enough so that the transmitter on time is not governed by receiver acquisition requirements rather than the data content of the packets. In the design of the Phase III modem (the so-called AFDEM) a 3-level search strategy was neces sary to accomplish a time to lock of 5 seconds (with a 5-kHz search range and two-sided loop bandwidth of 100 Hz).

With coded transmission the acquisition time becomes even more constraining. This situation clearly favors 2-phase PSK (which also is simpler to implement) because the total amount of data transmitted in a given time may be larger even if the data rate is cut in half because the receiver lock-up time is so much shorter.

Formats for Coded Transmission

Although not known very much to amateurs, there are simple ways to considerably improve the weak-signal performance over the capabilities offered by straight transmission of data. These methods make use of the prediction of the communication theory of Shannon that the performance may be improved by redundancy, i.e., transmitting more information than just the desired data and using this information to remove errors.

Typically the data stream transmitted is doubled (or also sometimes tripled) by producing two symbols from each data bit using a simple shift register and exclusive-OR gate arrangement (a so-called convolutional coder). This operation also can be performed entirely by software.

Recovering the data from the symbols is the more complex part of the operation. There are two different methods in widespread use. The so-called Viterbi decoding requires special and fairly complex hardware and is used mostly with continuous data. For amateur use this technique is probably too complex. For blocked data there is another technique called sequential or "Fano" decoding. This decoder can be implemented by software and requires little or no change in the receiving hardware.

AMSAT-DL implemented Fano decoders on the Radio Shack TRS-80 (tm) Model I and the Color Computer as a backup for the Phase III satellite -- should something make the links poorer than calculated. These decoders are fast enough to decode a few-hundred bits/s in real time.

The performance of these decoders is such that they can recover a block of data if the total number of symbol errors does

not exceed 3 to 3.5%. This means that an Eb/No of 2 to 3 dB at the symbol rate is sufficient, while normally 10 to 11 dB Eb/No is required for acceptable performance. Because the data rate is only 1/2, there is a net gain of about 5 dB - and all that is required is a short program in the computer which is needed anyway.

In view of this situation it would be a good idea not to preclude the use of coded transmission for packet radio. These considerations should be taken into account:

- An even longer sync vector is needed to allow a probabilistic recognition of this vector. AMSAT-DL uses an 8-byte vector - if 60 of the 64 bits are correct, symbol sync is declared.

- Differential coding (which normally is used with psk to eliminate the sign ambiguity of the carrier) cannot be used. For this reason the sync-recognition program also looks for the inverse sync vector and sets a sign flag accordingly.

- A CRC is not needed at the end of the block. Either the decoder can decode the received block - there is a negligible probability of error - or the decoder will declare the block as undecodable in the time allocated for decoding.

Conculsions

Some of the properties of the advanced synchronous communication techniques giving the best-known weak-signal perfomace were discussed. In order not to preclude the use of these techniques in the emerging amateur-packet-radio systems it is recommended that standards with the following properties be adopted:

- Sufficiently long sync vectors (4 bytes for uncoded, 8 bytes for coded transmission) should be adopted. The AMSAT vectors allow both simple hardware and software recognition.

- A fixed block length should be adopted to make the block end uniquely identifiable even in the case of bad error rates. This also allows making the blocks entirely transparent, i.e., arbitrary bytes (like binary data) may be included in the data of the block.

- Synchronous techniques should be recommended using efficient modulation techniques. Four-phase techniques (like qpsk or msk) should be used for data rates in excess of 10 kbit/s only because otherwise the carrier-recovery loop bandwidth becomes too narrow and the time to lock becomes excessive.

The author hopes that these hints based on the experience gathered during the development of the digital communication system of the AMSAT Phase III satellites will help to implement state-of-the-art communication technology with amateur packet radio. The price for this is only the understanding of the issues - realizing these ideas for the most part requires only appropriate software and is well with the reach of amateurs due to the widespread availability of low-cost microcomputers.

Reference

[1] Masnuski, "Asreement on Packet Radio Standards," QEX 12 October 1982 and ASR.

Date: 31 Jan 83 1711-PST
From: Alan Larson <WA6AZP at PPRS>
To: Hank Mashuski
Subject: amrpt.asm

I have gotten it to assemble here with a snobol translator to correct for the dirrerent assemblers. So far, one minor bug has been correctted, and the program has been made 3 bytes smaller. I was not sure how much ROM the repeater had availiable. I had hoped that there was more than 1K so there would be enoush room to add some telemetry information.

The big problem so far is that I cannot find my old 8080 book, so I am having to work from memory, but the program is refreshing my memory quite well.

How will it be possible (if possible at all) to debug this program? That seems the greatest fear now, is that once blasted into eprom, it won't work.

Alan

from: rob taylor
to: anyone interested in obtaining 1200 baud half-duplex modems for packet use.

VE3FZK has two modems for sale. FRom the description he gave, they are Sansimo (sp??!#@X) type. He paid $90, price nesotiable. If you are intertested: phone #'s 366-6124 or 366-5228.

TO: HM
FROM: DC
SENT: 30 JAN 83 03:34:00
READ: 30 JAN 83 06:18:55

Dear Hank,

I have in my possession a document entitled "Packet Radio Protocol Notes" dated August 5, 1981 and bearing your name. I obtained this item from Harold Price, NK6K, who claims that it is the basis for the Vancouver-compatible protocol implemented on the TAPR TNC. We would like to include this document as an appendix for the TNC manual which is currently in the final throes of preparation. The document would be taken as-is, except for a massive case-conversion and titled "Appendix C, VADCG Protocol Specification" or "Appendix C, VADCG/PPRS Protocol Specification".

May we have your permission to use this document?

Dan, KV7B, and I will be attending the Second ARRL Packet Conference in March. Expect our checks soon.

Margaret Morrison, KV7D

TO: HM
FROM: PLR
SENT: 30 JAN 83 01:44:52
READ: 30 JAN 83 06:16:16

To : Den Connors, KD2S/Lyle Johnson, WA7GXD
Hank Magnuski, KA6M

Info : Doug Lockhart, VE7APU
John Spragg, VE7ADE

Subject: Pre-Frame Sync

Despite outward appearances, I am making progress with the Level 1 document for AX.25 which will include those physical-layer requirements needed for Phase III-B packets. Den saw part of it during his latest trip to Washington. I've run into a slight snag and would appreciate your early inputs.

As you know, HDLC itself, per ISO 3309-1976(E), begins the frame with a flag. Para 3.8 gives only this guidance: "Inter-frame fill shall be accomplished by transmitting either contiguous flags or a minimum of seven contiguous "1" bits or a combination of both. A selection of the inter-frame time fill methods depends on systems requirement."

Also as you are aware, I am working with Bob Watson on the design of a modem which we are now calling "PAM" for Packet Adaptive Modem. It is a multi-speed modem with a constant frequency shift of 600 Hz. The speeds will be 75, 150, 300, 600, and 1200 bauds, remotely selectable via three lines. It started out life as an hf packet modem whose speed could be software controlled to adjust to changing ionospheric circuit conditions. The modulator design is finished. The (MF-10 switched-capacitor) demodulator design is well along, and that portion which operates at speeds up to 600 bauds is complete for optimal demodulation of fading hf packets. When we tested the demod, its performance was slightly degraded at 1200 bauds, owing to the usual problem of filtering out carrier components which are close to the signaling rate. We were planning to leave the hf modem at that then start working on a separate optimal (PSK-type) MSK demodulator, preferably one which is simple and easily reproducible. Then, in the examination of design alternatives, Bob was reluctant to give up the neat MF-10 mark and space filters. So, he is now designing an optimal, synchronous MSK demodulator which is an add-on to the original MF-10 design. So what we'll end up is a modem which is an optimal limiterless type for hf 600-Hz-shift FSK at 75, 150, 300 and 600 bauds and an optimal MSK demod for 1200 bauds. The 1200-baud speed is primarily intended for satellite work but could also be used for terrestrial packets and hf (particularly on 10 meters when the path is good). I plan to present a paper on this modem at the March 19 packet conference.

So, on to the purpose of this message. In order for a synchronous demod to attain lock, it needs to sample both mark and space frequencies, preferably more than once each. This is true not only for the above-described modem but also for other synchronous modems. A synchronous modem buys us 3 dB, nothing to fritter away for satellite or long-haul terrestrial vhf/uhf packet paths.

Ideally, it would be good to have a pre-frame sync of 2 octets of reversals. Probably not as good, but possibly good enough, would be the transmission of 2 flags before the start of the frame. Unacceptable possibilities (for synchronous modems to work) would be (a) the binary "1" idle (marking) condition or (b) nothing at all.

I checked the Intel 8273 data sheets and found that sixteen line transitions are guaranteed with the chip in the Pre-Frame Sync Mode. Also, I note that this mode is enabled in the Vancouver TIP.

With the information readily available, I was unable to determine whether pre-frame sync (reversals) was possible with the Zilog 8530 or the WD-1933. Terry Fox, WB4JFI made a couple of calls to Zilog and was told that it is possible to produce with liberable amounts of chicken blood (of the software type).

Now, I'm finally coming to the point. What can you tell me about the possibility of implementing the 16-transition type of pre-frame sync on the WD-1933 which you are using? Have you implemented it and how? I would appreciate your inputs as soon as possible.

I would like to be able to write pre-frame sync into the Level 1 document. Eric Scace, K3NA advises that this subject belongs to level 1 (not 2) because it deals with extra-frame signals which are there to make the modems work.

Bob and I realize that this demod is not the simplest one that could be used to copy the satellite. We are also working on a simplified PLL-type suboptimal MSK demod and will let you know more about this one when it is further along.

73, Paul, W4RI

Date: January 29, 1983
From: Curtis, N6ECT
To : All Interested Packeteers

Subject: Software Replacement for the SDLC 8273

Just in case that you haven't come across this short article, W4UCH/2, usins a TRS-80 Model 1, has created a software 8273.

You can find this article on page 53 of the February 1983 issue of QST; titled "PACKET RADIO - A SOFTWARE APPROACH.

73, -CAS-

Hank,

Last night there was a board meetins of the San Francisco Radio Club, and I brousht up our conversation on the SFRC actins as "suest host" and usins their repeater as a "host" repeater. The board asreed that they would help host this event, but had several questions. They wanted to know if they were to "man" their "table", FRI, SAT, & SUN, and how many people would be required to help, etc. I told them that we were not quite into the final steps of preparation, and that I would report back to them at our Feb. 25 board meetins. Perhaps we should have another set-tosether in the near future, to see how thinss are prosressins.

73 & best -cas-

TO: HM
FROM: PLR
SENT: 24 JAN 83 16:20:05
READ: 24 JAN 83 21:19:40

To : All Packeteers
From : Paul Rinaldo, W4RI
Subject: Letter from Jens Zander, SM5HEV

You are sure making progress on standardization. It was with great interest I read first the AMSAT Satellite Report and then the copy of QEX you sent me. The HDLC/AX.25 as proposed there has seemed to gain quite some foothold in the U.S. It will most certainly be incorporated as one of the basic formats in SOFTNET for radio links.

We've also been making some progress, however not on the UHF transceiver. Another redesign! A group in Stockholm has now taken responsibility to make a design of their own. The specs still hold however:

100-kbit/s bit rate
MFM clock coding
FSK/MSK modulation
434-MHz center frequency

The software and computer group has made some more progress. A software specification including a user manual/implementers' guide is almost finished. We are currently testing the network concept using a twisted-pair cable as transmission medium. This has proven to be an excellent "channel simulator" to test our algorithms (cf ULC net presented in BYTE magazine last year). Five nodes using the SOFTNET protocol are in operation with speeds up to 9600 bauds. the 100-kbit/s data rate is at the moment not possible since we have only one prototype of the high-speed hardware. The main (node) CPU of our system is available in kit form including the basic M-FORTH multi-tasking software in two 2732 PROMs. The pc layout of the LINK computer will be made during January.

A few notes on the lowest level (LINK) formats we are using at the present. The packet format is recognized by the first bytes (chars) in the packet, the packet Format Word FW. This is the characters " F " in the case of the basic SOFTNET format F as described below. In the case the first byte should be a HDLC-flag the packet will be recognized as a AX.25 packet and handled that way. A brief (and preliminary) description is enclosed. We will mail you a copy of the full user's manual and Implementors guide as soon as they are printed. Feedback would be appreciated. We would also like to attend the San Francisco conference, at least one of us.

73, Jens Zander, SM5HEV, Linkoping University, S-581 83
Linkoping, Sweden.

(Enclosure)

1. HARDWARE SPECIFICATIONS

Operating frequency	434.000 MHz
Modulation	FSK, frequency shift 50 kHz (MSK)
Bit rate	100 kbit/s
Coding	MFM clock coding
Signalling format:	

```
**************************************************************
* Preamble *  SYN1  *                Packet                  *
**************************************************************
```

Preamble: At least 20 transmitted consecuttive '1' s corresponding to 40 zero-crossing on the channel

SYN1 : At least 3 ASCII SYN characters

Packet : Any number of bytes less than 256

Transceiver control and measurements:

Transmitter control: Power controllable in 16 5-dB steps.
Range: -20 dBm -- 55 dBm (4 bits)
Transmit/receive switching (switch time less than 1 ms)

Receiver output: Slow SNR reading (Channel quality check):
Received (S+N/N) IN 16 3-dB steps.
Time constant > 10 ms (1 packet)
Range: 0 dB -- 45 dB (4 bits)

Fast SNR reading (Channel busy check):
Received (S+N/N) threshold detector (1 bit)
(Tc < 50 us). Threshold presetable in
16 steps (4 bits) of 3 dB each.
Range: 0 dB -- 45 dB

Received SNR (S+N/N) measured at data detector.

LINK programming environment

The LINK programming environment consists of a FORTH dictionary with two vocabularies, the LINK vocabulary and the LFORTH vocabulary. When a packet enters the LINK machine interpretion is commenced with the context pointer pointing at the LINK vocabularly. The LINK vocabulary can be said to represent the programming environment for non-priviledged users. In this vocabulary only a few words are available. These are listed below. Among them are the so-called format words, which define the access algorithm and the format of the packets used. The standard system has at least to contain the two standard format words 'F' and 'A' described below.

2.1 The LINK vocabulary

F ----
A ---

Together 'F' and 'A' describe the basic Softnet channel-access algorithm. The following is a description of this algorithm.

Access algorithm:

Defer : Any node may transmit a packet if
*Transmissions are not blocked as result of a previous conflict
*The channel is sensed to be free for at least 2 ms, corresponding to the duration of an ACK packet plus switching times and path delays.

ACK : When a node receives a correct (BCS-check) 'F'-packet which contains the address of the receivins node, interpretation of 'F' should result in the immediate transmission of an 'A' acknowledse packet (no channel busy check applies). The ACK should be transmitted with 2 ms after the reception of the 'F'-packet. If an incorrect packet or a packet with erraneous format word is received no acknowledsement should result. Broadcast packets, i.e. packets containins 'wildcard' address fields should not trisser the transmission of acknowledse, even if a match is obtained in the address check procedure.

Conflict: A node detectins a conflict by mission acknowledsement packets after 2 ms will block its transmissions for a random amount of time. This delay is rectansularly distributed over the interval (0,100 ms). The defer procedure applies also when attemptins retransmission. This procedure is repeated the number of times specified by the user (See NODE environment for details).

Packet handlins procedure:

'F'-packets

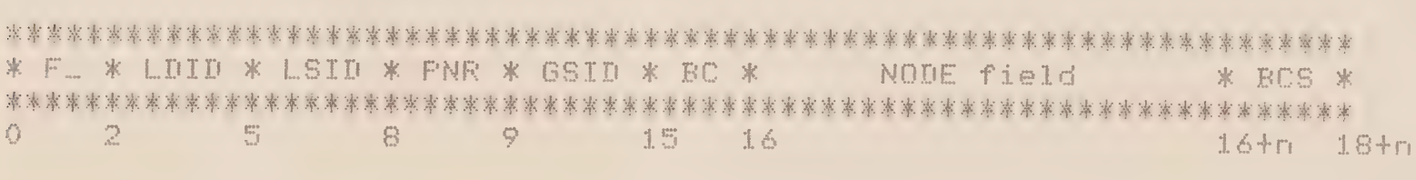
Receive all incomins packets and check the packet BCS (check-sum) field. If the checksum is correct, check LDID. If packet has correct destination and does not contain wildcard address fields, issue an A-packet, switch to the NODE environment and start interpretation of the NODE field (below). In case of conflict, retransmit an 'F' packet the number times specified in the NODE environment.

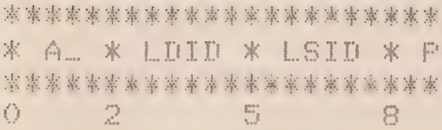
Always check if the LSID (see below) is known to the node. If not, update the NEIGHBOR list (see NODE environment for description).

In case that some known neighbor node does not acknowledse a transmitted 'F' packet after the maximum number of retries, this neighbor is delected from the NEIGHBOR list.

Packet formats:

The two format words 'F' and 'A' also define a basic packet format as depicted below.





Comments:

The 'A' packet uses reversed local IDs to simplify acknowledsement

procedures, i.e. Local source is the local destination of the 'A'-packet.

BC : Byte count of Node field (n).

BCS : Block check sum, 2 bytes wide of total packet (18+n) bytes.

$$BCS = \left(\sum_{\text{all } i} Wi \right) \bmod 2^{16} \quad Wi = 2 \text{ byte word } i$$

GSID: Global source (origin) of packet. Packet owner ID.
6 globally unique ASCII characters (for instance call sign).

LDID: Local destination of packet (=3 last bytes of global ID)
The destination may contain one or more 'wildcard' characters
(ASCII NULL = 00 hex) which matches any character in that
position at the receiving node.

LSID: Local source (origin) of packet (= 3 last bytes of global ID)
No wildcards are allowed.

NODE: An even number of bytes. This field is interpreted by the 'F'
word after selection of the proper NODE environment.

PNR : Packet number, 1 byte. Two consecutive packets transmitted
from some node to the same destination have to use
distinct packet number.

73, Paul, W4RI

Hank, I got a returned letter/not deliverable as addressed. It was addressed to William Croft, KD6RG at 22 Coleman Place, Menlo Park, etc. If you see, or hear from Bill, could you get his correct mailing address? tnx, -cas-

Hank, I have been in bed all last week with hay-fever, which is just starting to leave, ... anyway, this is just a reminder that someone might want to bring a terminal to the meeting. I can't remember if we we discussed this at the meeting. I have another meeting that night, so probably won't be able to make it. I am also going to drop a shorter version of this message to Bob & Stu. 73, best CUL Curtis

TO: HM
FROM: DC
SENT: 22 JAN 83 03:52:58
READ: 23 JAN 83 04:03:58

To all

Current Beta status is a positive one....first production boards were picked up today. The wave solderins went without a hitch and first tests indicate none of the problems faced last month....
One word of warnins....the TNC's are RF sensitive, so be on the lookout for a suitable enclosure!

Pete WB9FLW, Tucson AZ 1/22/83

TO: HM
FROM: PLR
SENT: 22 JAN 83 13:21:23
READ: 23 JAN 83 04:04:13

Hank,

To my MSG #A25334 of yesterday, please add to the list of conference speakers: Bob Richardson, W4UCH. His paper will be on the subject of "Packet Radio - A Software Approach." It's a paper on doing virtually all that the VADCG TNC does, but in software on a TRS-80 Model I or III. Also, add (under "The program will include:") "software assembly and disassembly of packets."

73, Paul, W4RI

TO: HM
FROM: PLR
SENT: 21 JAN 83 13:15:56
READ: 22 JAN 83 03:14:15

To : Hank Magnuski, KA6M
Subject: Packet Conference Preregistration Announcement

Here is the text of an announcement based on our telephone conversation of January 19. I neglected to ask you how checks should be made out (e.g., to PPRS) but figured that if they are payable to you, you can endorse them to the correct account.

This announcement will be carried in QEX and the AMRAD Newsletter for February. Suggest you make similar releases to west coast newsletters.

Second ARRL Packet Conference

The ARRL's Second Amateur Radio Computer Networking Conference will be an all-day meeting held on Saturday, March 19, 1983 in a room set aside within the West Coast Computer Faire in San Francisco, CA. The Faire itself runs from Friday, March 18 through Sunday, March 20. So, if you are interested in participating, the best scheme is for you to plan to see the Faire on Friday so that you can be free to attend the packet gathering on Saturday. The exhibits are not quite so crowded on Friday; however, it's elbow-to-elbow exhibits on Saturday and Sunday. Alternate Plan B would be for you to attend the packet conference on Saturday and the Faire exhibits on Sunday afternoon.

Technical papers will be presented by a wide variety of speakers. Here is a partial list of conference speakers:

Dan Connors, KD2S
Terry Fox, WB4JFI
Dave Henderson, KD4NL
Hank Magnuski, KA6M
Dan Morrison, KV7B
Margaret Morrison, KV7D
Harold Price, NK6K
Paul Rinaldo, W4RI

The program will include:

- the evolution of packet radio,

- 4x.25 packet protocol,

- several aspects of the development of the Tucson Amateur Packet Radio (TAPR) Terminal Node Controller (TNC) hardware and software,

- Packet Assembler/Disassembler (PAD) and Packet Adaptive Modem (PAM) designs by the Amateur Radio Research and Development Corp. (AMRAD),

- The Pacific Packet Radio Society (PPRS) will conduct live packet radio demonstrations throughout the Faire.

Participants are urged to preregister by sending a check payable to "Henry S. Masnuski" in the amount of $19 (to cover both Faire and the packet conference tickets) to:

311 Stanford Ave,
Menlo Park, CA 94025.

The price includes a personal copy of the proceedings which will contain all of the packet conference papers. Tickets will be mailed to you. Late registration at the door will be possible at slightly increased price and inconvenience. Also, there will be an opportunity to purchase copies of the conference proceedings by mail after the conference for those who are unable to attend. The price and where to order the copies will be announced later.

Plans are for a luncheon for those interested at the nearby Salmagundi Resaurant on Saturday at noon. Saturday evening will be open for random access.

Anyone wishing to appear on the program or have a paper included as part of the proceedings should contact Paul Rinaldo, W4RI, on 703-734-0878 (days/eves) immediately. There is a little flexibility in the previously announced February 5 deadline for camera-ready papers, but not very much and still get the proceedings printed in time for the conference.

73, Paul, W4RI

Posted: Fri Jan 21, 1983 1:47 PM PST Msg: CGEB-1510-4422
From: DEN
To: amsat
Subj: TAPR status

First 60 TAPR packet radio boards have arrived, and are to be shipped next week. More coming.

Annual TAPR meeting coming up Sat Feb 5th, in Tucson. AMSAT to play a prominent role. All AMSAT members are cordially invited, and food is FREE. Lodging may be arranged. Send me a message if you're coming, or want more info.
Den

Posted: Thu Jan 20, 1983 4:44 PM PST Mss: 0GEB-1509-8600
From: PKARN
To: docs
SubJ: FCC Proposes No Code License - AP
From uucp Thu Jan 20 19:34 EST 1983
>From daemon Thu Jan 20 19:36 EST 1983 remote from alice
(a0714) r w AM-AmateurRadio 01-20 0568
^AM-Amateur Radio,490<
^Dah-di Dah-dah-dah Dah-di-dah-di Dah-dah-dah Dah-di-di Di, Says FCC - Maybe<
^By NORMAN BLACK=
^Associated Press Writer=

WASHINGTON (AP) _ Bracing itself for controversy, the Federal Communications Commission proposed Thursday to create a new type of amateur, or ``ham,'' radio license that could be obtained without knowing Morse Code.

The mere discussion of the idea has provoked outrage among the amateur community in the past. But it was described by a top FCC official Thursday as a needed step to attract more young people into the amateur radio service.

``I certainly expect controversy, no question,'' said James C. McKinney, the chief of the FCC's private radio bureau. ``We already know two-thirds or more of the licensed hams are opposed, because they see this as easing standards that they had to meet. But I feel very strongly that it's important today to encourage more young people into the service and they perceive no value in the Morse Code.''

``I'm sure the situation is going to get very loud,'' agreed Perry Williams, the Washington coordinator of the American Radio Relay League, the largest of several ham radio organizations. ``There's going to be a lot of mail and a lot of activity. I'm sure there's going to be a great deal of unhappiness among the rank and file, and I'm sure many will call on their representatives in Congress to intervene.''

In a related action, the FCC also proposed to establish a system for using volunteer ham operators to administer the tests that are required to obtain licenses. Such a system was authorized last year by Congress and has been endorsed by the amateur community.

While ham radio operators are generally perceived to be interested only in using radio to communicate over great distances, the FCC has always treated them as a special asset because many have become involved in experimenting with new technologies.

Amateur operators also frequently play a critical role during natural disasters or emergencies when other communications circuits are knocked out.

Amateur licenses have never been easy to obtain, because an applicant must not only show a great deal of technical knowledge but also must pass a Morse Code telegraphy test. Novices must be able to send and receive five words per minute in the dot-dash system; the top license requires 20 words per minute.

Despite such requirements, FCC officials find it incongruous that at a time when young people are becoming more and more interested in electronics, the amateur radio service is not growing.

According to the agency, there are roughly 412,000 licensed amateur radio operators in the United States, a number that has remained fairly static over the past four years.

The proposal issued for public comment Thursday seeks to attack the problem by creating a special ``No Code License.'' Individuals who received such a license would be limited to using certain short-range radio frequencies.

``The youth of today are very comfortable with technology and

computers but they're avoiding the amateur radio service,''
McKinney said. ``I would like to see an easy entry point for those
with no interest in Morse Code but whose interest in technology
could help improve the service.''
``We don't agree that it will necessarily help,'' countered
Williams. ``We've got a good service. The FCC has repeatedly said
so. So if it ain't broke, why fix it? This is going to be a very
emotional issue in the field.''
AP-NR-01-20 1755EST<

TO HANK 1/19/82

FROM JIM ,KA6ETJ

This is just to let you know that i am still around. I haven't been to active as you can tell but i am still kicking.

I want to let you know that i am avaible if you need some help for the Packet Conference in March. I will mention to Stu also in case he need help with the demos.

I keep trying to set Dave to finish his board and set on the air. I do think he is setting close though.

I will try my best to set to the meeting on Tuesday.

73's Jim

Hank, please foreward.. tnx -cas-

To$ W4RI, Paul Rinaldo
From$ N6ECT, Curtis Spansler
Date$ January 19, 1983

Subject$ Packet Conference News Release/WESTLINK

Dear Paul$

I sent out, in combination with yours, 76 annoucements for a call for papers for the "Second ARRL Packet Conference".

Are you going to contact the Westlink Amateur New's people for a spot on their broadcast, or wait and send them an event announcement?

73, Curtis

Date: January 15, 1983

Subject: General Meetins ** T N C Clinic

The next seneral meetins of the Pacific Packet Radio Society will be held:

TUESDAY - JANUARY 25, 1983 - 8:00 PM

at the:

?

Havins trouble settins on the air with packet? This month's meetins is for you. Hank (KA6M), Bob (W6JHJ), and Stu (K6VCO) will be your hosts to help with hardware problems, interface problems, etc. Brins your problems, your hardware, your interface schematics, and any documentation that you misht need to the meetins.

Also enclosed is the "Second ARRL Packet Conference Call for Papers". Even thoush the deadline is Feburary 5, we misht still be able to set an extension on the deadline date.

I have also included some "old" information on how to use various functions on the DG "Packet Central".

Second ARRL Packet Conference Call for Papers

The ARRL is sponsorins a second Amateur Radio Computer Networkins Conference on March 19, 1983 in San Francisco, CA. The conference will be in cooperation with the 8th West Coast Computer Faire beins held March 18-20.

The deadline for camera-ready papers is February 5, 1983. All papers should be mailed to Paul L. Rinaldo, W4RI, 1524 Sprinsvale Avenue, McLean, VA 22101. If you plan to speak, please request an author's suide and advise Paul of the title of your paper immediately. Proceedinss for this conference will be separate from those for the Faire which had a deadline of November 30, 1982.

Technical papers are invited on all aspects of amateur packet radio, advanced radioteletype (RTTY) includins AMTOR, and related Amateur Radio disital communications via hf, vhf/uhf and satellite media. Topics may include network and system architecture, proposed standards, hardware, software, protocols, modulexcellent opportunity to have your ideas influence the future of amateur disital communications.

This event will be hosted by the Amateur Radio Research and Development Corporation (AMRAD) and the Pacific Packet Radio Society (PPRS).

********** HOW TO USE THE DATA GENERAL **********

Here is some basic information on how to use this computer system --

Access - Via packet radio, callsign is KA6M**
Via 300 Baud 103 modem, dial 415-858-0422.
Normal operation is half duplex (local echoing)
Please be sure to disconnect when you are done.

Logon - Username is PACKET, password is NET
The computer treats CR and LF as equal terminators,
so don't send both in responding to the username question.

Commands - HELP lists all commands available
DOCS lists all documentation files
F/S list all files in the PACKET username directory
F/S/AS list all files with more extensive info
TYPE x types o BYE logs out of the system
CHAR change default characteristics for your terminal
CHAR/OFF/ST Turn tab simulation off. For file transfers.
CHAR/ON/ST Turn tab simulation on. Restores tabs.

Files - HOW.TO.XXXX more info
PACKET.USERS who's on the sytem
CALLS.LOGGED history of logins
TEST.FILE performance testing
XXXX.DOC various documentation files

Panic - Type Control-C Control-B Linefeed
This will extract you from most situations, logs you off.

Type Control-C Control-A Linefeed
This will stop long typeouts, without logoff.

&*&*&*&*&*&*&* EDITING TEXT FILES INFORMATION SHEET &*&*&*&*&*&*&*

The text editing program on this system is called LINEDIT.PR and is invoked through the commands

EDIT
EDIT filename

The editor is completely documented on-line, and to get a current listing of the commands, type

HELP

as soon as the question mark prompt is displayed. Individual topics are explained by typing

HELP topic

Start by reading about these commands:

BYE, DELETE, FIND, INSERT, LIST, MODIFY, SUBSTITUTE

$$$$$ Information on how to leave a message for another user $$$$$

The simplest way to leave a message is to use the CREATE/I command --
First, create the file using a command of the following form:

```
        CREATE/I CALL_FM_MYCALL.DAY
        CREATE/I CALL.DE.MYCALL.DAY
```

The system will return with a double parentheses prompt:

```
        ))Enter the text you wish, and when you type CR-LF you'll get
        ))another prompt for input to the next line.
```

The double prompt will continue until you type a line conta single right parenth

```
        )))
        )NEWCOMMAND
```

On the next single parenthesis prompt, you are back in command mode. You may use EDIT to modify your text. See HOW.TO.EDIT.

Hank, this is the message that is waiting to go out... I still have some touching up to do, but will do that when the LOCATION is confirmed. If finding a location is a problem you might want to consider GAMMA??? Anyway..nice meeting last night; I felt that we got a lot done. I will probably be on here later. C U & 73 -cas-

Hank,

I finished the mailins today, 76 letters. Please advise Paul W4RI, that I also sent out his mailers. The followins are changes to the current mailins list:

William J. Croft, KD6RG
22 Coleman Place, Menlo Park, CA 94025

Phil Marquis, K6HSV
543 Bayview Ave., Millbrae, CA 94030

73 - January 15, 1983 -cas-

From: Curtis, N6ECT
Date: January 15, 1983
To : All Interested Packeteers

Subject: January 25, 1983 Meeting (T.N.C. Clinic)

Under DOCS there is a file PPRSJAN.DOC this is a copy of the mailing that was sent out via U.S. Mail to the current PPRS mailing list.

73 & Best -cas-

P.S. The letter looks better than the file that got transmitted sorry...but I tried to tx it about 4 times.... and oh well.

Hank, I dated my mss for the wrong day -- should be Jan 13 not Jan 12.
See u tonisht Jan 13, thursday..... have a sood day. -cas-

Hank,

I will be looking for your arrival tonisht. Just in case that you need directions: Take 101 North to the Fell Street exit. Follow Fell to Masonic Street (about the middle of the Panhandle) and turn left. Go three blocks to Haisht Street, and turn risht. The first street on Haisht that you come too is Ashbury. Turn left on Ashbury Street, and I am in the middle of the block -- 644 ASHBURY @ 552-3430. I will monitor 146.580 simplex. C U & Bob & Stu tonisht.... 73 & best de N6ECT.

-cas-

Posted: Mon Jan 10, 1983 7:49 PM PST Mss: VGEA-1504-3139
From: TCLARK W3IWI
To: hmasnuski KA6M
SubJ: Welcome!

Welcome aboard -- you've been so quiet I didn't know you were here. Don't know if u hrd abt the wild-assed hair-brained idea of mine. Looks like we may have the telescopes at Green Bank on EME in may. I thought it might be nifty to try packets off the moon as a nifty gimmick. Suggested possibly using the SRI 150' on ur end. You might want to chatt with Bob Leonard and see if it just might be do-able. If so, we'd probably be best off with straight FSK (SSB riss) like N5AHD & I did on 10m. Either 144 or 432 would be FB since it looks like we will try both during the month of May.

Terry reported that you have TIP/LIP for AX.25 running. Will be anxious to hear of progress. Tried to spur TF to finish the AX.25 spec & description document since he'd done vy little. Any spur from ur end will be likewise appreciated.

Rumor has it that AX.25 is also on the air in So. Calif. now too! Long Live the King.

tom

To: All SRI Packeteers
Fm: H Masnuski
Date: Jan 11 83

Can any one of you follow up on this request?

Hank

Hank,
I don't mean to be a pain....., but we should get started on the conference stuff.....,,,, also, what about a meeting?
73, best -cas-
P.S. I hate to send busy people more business (chuckle)!!!

Hank,

Here is his mailing address. He was especially interested in the TAPR boards, you can give me the TAPR address, I can mss that to him. Also, if your starter is on-line at the DG and you can point me to the filenames, I can mail that via the Arpanet also to save mailing costs. Thanks for your help,

BRD

P.S. Here is a response to my initial message to him. His comment about not exploiting anyone refers to a comment I made that the Ham Radio packet radio was legal for non-commericial use (in the FCC legal sense) and he thought I meant th was some sort of copyright on it, I guess.

Received: from USC-ISID.ARPA by PARC-MAXC.ARPA; 10-JAN-83 10:30:57 PST
Via: USC-ISID ; Monday, January 10, 1983 09:54:45-PST
Via: UNKNOWN-HOST; ('') to UCL-CS (44c) over Unknown Network; 23 Dec 82 14:16-GM
From: Leslie French (on ICF GEC 4090 at Rutherford) <NSIN12 at RLGK>
To: danielson@parc-maxc@ucl-cs
Date: Friday, 17 December 1982 15:31-GMT
Subject: SF Packet Radio
Message-Id: <23 DEC 1982 14:16:17 NSIN12@RLGK>

Thanks for your message.
That was precisely the sort of information we are after.
As to location, my Postal Address is:

L. J. French
Atlas Computer Centre
Rutherford Appleton Laboratory
Chilton
Didcot
Oxon
OX11 0QX
ENGLAND

which is in Oxfordshire, about 20 miles south of Oxford itself and 70 miles NW of London (Just to give you some Geography).

NB this is a government-funded research laboratory, not a profit-making organisation - we aren't out to exploit anybody, just interested in the concepts/workability.
Having said that we'd quite like to see designs for boards etc.
Do you have the address (postal if you must - m/c is nicer) of someone in the Tucson group we could approach in this line?
Given suitable agreements about what we would do with it, how do you think they will react?

N E Way, many thanks for making the effort to reply - what I have just read looks VERY good to my eyes.

Leslie

TO: HM
FROM: PRNET DC
SENT: 07 JAN 83 21:02:51
READ: 09 JAN 83 00:53:40

Paul,
There are several more hams who have learned of the ARRL Packet Conference, and are anxious to present papers. Please consider the following participants:

"Implementation of AX.25 Protocol on TAPR TNCs", by Dave Henderson, KD4NL

"The Friendly TAPR TNC User Interface", by Harold Price, NK6K

"The TAPR Hardware Software Real-Time Interface", by Margaret Morrison, KV7D

"The MF-10 Switched-Capacitor Audio Filter for the TAPR TNC",
Dan Morrison, KV7B and Margaret Morrison, KV7D.

I know most of these folks have given talks before. If you want to roll any of these talks together, feel free. I hope you'll allow commensurately more time for those presentations.

We will certainly have a lot of things to demonstrate at the show.

73, Dan

Hank,

PLEASE ADD TO MAILING LIST:

Chan, WA0NT
Croft, KD6RG
Ferise, W6KYF
Rice, WA6PAC
Ruhl, WA6WPF
Teesue, KA6HWJ
Worthington, WA6WLE

I have a current count of 33 people on the mailing list, 30 received here and 3 received from you.
I also have some address corrections for you, but will send later.
Perhaps we could meet for dinner first at the pizza place I go to, and return here to continue???
73, & best
-Lee-

To: Whom it may concern
From: Hank Magnuski
Date: January 7th, 1982

Subject: 1983 Packet wish list

The followins is a list of projects which have at one time or another been proposed by various people and which, in general, never saw the light of day. Its purpose is not to criticize any particular individual (we are all busy and have work, family and other interests which supercede packet), but to document some of the promise which packet has held which is as yet unfulfilled.

Hopefully, in 1983, we will see some of the items dropped from this list!

1. Promises of other bulletin boards, conference trees, mailboxes, to be established as servers on this network. The DG remains the one and only.

2. An RTTY gateway or an RTTY mailbox packet port.

3. Better mailbox software and interface for the DG.

4. Network performance analysis writeups.

5. A 20 meter or other HF packet port or gateway.

6. PPRS Bylaws written up.

7. More VADCGs on the air. I have sold TNCs and burned eproms for people who just disappeared into the woodwork. The completion rate of projects is surprisingly small.

8. The regular transfer of ARRL bulletins and HAMNET bulletins to our network.

9. Interface boards for the APPLE, TRS-80, and IBM PC.

10. Linkup to LA. Selection of RF sites and channels.

11. Networking software.

12. Improved DG host port facilities (antenna & software)

On the positive side, these two events are very significant:

National agreement on link level standards.

Development of the TAPR TNC board.

TO: HM
FROM: DC
SENT: 06 JAN 83 18:43:05
READ: 06 JAN 83 18:50:43

TAPR status...
two boards hand-built and currently working without problem
three boards being wave-soldered by integrator right now
all blank boards in Lyle's hands

Here's hoping!

Dan

TO: HM
FROM: DC
SENT: 04 JAN 83 06:01:20
READ: 04 JAN 83 07:36:47

Dan and Marsaret Morrison (KV7B&D) reported this evening that the first of the new run of TAPR TNC boards is now operational.
The board was received and assembled by Lyle WA7GXD this afternoon and early evening, and delivered to the University. Dan reports that the installation was by-the-book, and first packets ran perfectly at 1200 baud. More info to follow.

Den KD2S

Hank,

I wanted to advise you that the Amateur Packet Radio panel session at the Second Annual Joint Conference of IEEE Infocom will be Thurday, April 21 at 8:30AM. Your name appears on the program, per our discussions at the AMSAT meeting. If you want to have a paper published in the proceedings (optional), you would file it as paper G41.

I should be getting a copy of the Telemail documents within a week or two, and will forward.

Den

TO: HM
FROM: PLR
SENT: 15 DEC 82 14:17:20
READ: 15 DEC 82 17:56:17

To : Hank Magnuski, KA6M
Subject: Release of Packet Conference Call for Papers

On December 14, I met with Dave Sumner, K1ZZ, ARRL General Manager, and obtained his oral approval of ARRL sponsorship of the second packet conference and to release a call for papers.

Below is what I plan to publish in the January AMRAD Newsletter which should go to the printer on December 17. I will also take care of sending it as a news release to amateur magazines and newsletters with national coverage and packet clubs other than the West Coast. You can go ahead with West Coast publicity.

NEWS RELEASE

Second ARRL Packet Conference Call for Papers

The ARRL is sponsoring a second Amateur Radio Computer Networking Conference on March 19, 1983 in San Francisco, CA. The conference will be in cooperation with the 8th West Coast Computer Faire being held March 18-20.

The deadline for camera-ready papers is February 5, 1983. All papers should be mailed to Paul L. Rinaldo, W4RI, 1524 Springvale Avenue, McLean, VA 22101. If you plan to speak, please request an author's guide and advise Paul of the title of your paper immediately. Proceedings for this conference will be separate from those for the Faire which had a deadline of November 30, 1982.

Technical papers are invited on all aspects of amateur packet radio, advanced radioteletype (RTTY) including AMTOR, and related Amateur Radio digital communications via hf, vhf/uhf and satellite media. Topics may include network and system architecture, proposed standards, hardware, software, protocols, modulation and encoding schemes, and applications. This is an excellent opportunity to have your ideas influence the future of amateur digital communications.

This event will be hosted by the Amateur Radio Research and Development Corporation (AMRAD) and the Pacific Packet Radio Society (PPRS). Making up the conference committee are:

Hank Magnuski, KA6M	- Coordination (PPRS)
Stu Neblett, K6VCO	- RTTY & Packet Demos
Bob Reiling, W6JHJ	- Faire Liaison
Paul Rinaldo, W4RI	- Coordination (AMRAD) Technical Papers
Curtis Spangler, N6ECT	- West Coast Publicity

END OF NEWS RELEASE

Concerning finances for the conference, everyone on the

committee should keep receipts for all reimbursable expenses which are directly in support of the conference. I suggest that act as focal point for to answer any PFRS committeemens' questions about what expenses are reasonable and proper. The lion's share of the expenses will be printing of the proceedings, and I will be responsible for that. For the first conference (and sales of proceedings afterwards), we charged $5 for the set of two volumes and lost a little money ($122.77 overall) which was reimbursed by the ARRL. A charge of $6 would have put the first conference in the black. A break-even figure for this one is probably around $7, assuming that we don't print proceedings that are eventually unsold. We printed 200 copies for the first conference. We ended up Xeroxing a couple dozen more for late, late requests. So, your figure of $9 for advance registration seems to be very safe, with about two dollars margin. It is reasonable to ask for one dollar more at the door (for incentive to pre-register) and for proceedings ordered by mail (to pay for envelope and postage). So, with that seat-of-the-pants financial forecasting, do you still feel that we should settle on your figures of $9 advance, $10 door/mail or can we lower both figures by a dollar? I think we should agree on the final figure as soon as possible because we will need to release pre-registration publicity very soon.

We also need to develop a sense of how many people will come and/or order proceedings by mail prior to printing deadline. I would guess that we're talking about 300, possibly more, this time.

73, Paul, W4RI

To: ALL NO. CALIF. Packet users
Fr: CSU Chico packet group.
Re: CSU Chico packet repeater.
On: 1-Dec-1982

The CSU Chico packet repeater is now on the air on 146.58 Mhz with the call WD6BPR/RPT. It operates low level from the CSU Chico campus with a home-brew J-pole antenna about 35 ft AGL.

We are using Bell 202 type modems out of the financial terminals Electrovalue Industrial in N.J. was selling. These modems are CCITT V.23 modems instead of BELL 202, however to convert them only requires changing two resistor values. For $55.00, we could not complain. We are using the modems and power supply from these terminals, and have not even touched the rest of the goodies.

We currently have two nodes and the repeater working, and a third node is under construction. We are using the VADCG TNC boards and various 2m rigs ranging from a Kenwood 2400 to a Yaesu FT-221 with equal success. A RBBS system will soon be online as soon as the software decides to work.

Any questions may be addressed to Jim (WD6BPR) (916)893-0385 or Mike (WB6KTN) (916)345-1966 or on 146.49 MHZ simplex.

Many thanks to Hank for all his help. Without his support we would still be debugging code.
. It operates low level from the CSU
Chico campus wit

TO: HM
FROM: DC
SENT: 05 JAN 83 03:19:01
READ: 05 JAN 83 04:32:54

Hank,

I will send you a set of user manuals. This network now has about thirty members of the board, command stations, publications and ensineerins. KA9Q and other AMICON sateway station particiPants are also available. The system is not free, but we are Pickins uP the service at cost. You have by far the best tyPe of system for use of the net; automatically Pickins uP all mail and sendins files will save a factor of five in cost. Also, usins nisht rate of $4/hr sure beats $14/hr durins the day.

Obviously, this net is still the best in terms of cost-effectiveness!
More to follow, but if you just want to check in and Play a little, try this:

```
signon: <cr> <cr>  => telenet  ( can you set the local telenet # )
        d1 <cr> for terminal tyPe
        MAIL <cr> to set onto Telemail
        HMAGNUSKI/AMSAT <cr> or HMAGNUSKI <cr> for sisn-on ID
        A <cr> for Password
        CHECK AMSAT <cr> READ <cr> => bulletin board messases
        READ! <cr>  => read all messases to you
        COMPOSE TRAINER to learn how to send messases
        ? for help files
        BYE <cr> to so away
```

Den

856 9995

TO: HM
FROM: DC
SENT: 31 DEC 82 18:56:19
READ: 01 JAN 83 18:19:46

Hank,

We've started up an AMSAT division on TeleMail this week, to coordinate the engineering and operation projects. I think you'll find it easier to get to some of the AMICON people there.

If you're familiar with TeleMail, your ID is HMAGNUSKI/AMSAT, or just HMAGNUSKI. Although we can't use call signs (too obvious), I can change your ID to something else if you'd like. Your password is A, and your personal ID is B.

If you need instructions, I'll ship some information, and explain the online help facilities.

73, Dan

HANK -

I NOTICED THAT YOU HAVE SEVERAL Z-19 TERMINALS; I AM PRESENTLY USING AN H-19 WITH "CHAR/CRT4" (SINCE THAT IS THE ONLY WAY THE DELETE KEY WORKS). BUT USING SED, IT DOES NOT ERASE "OLD TEXT" ON THE SCREEN. DO U KNOW OF ANY SIMPLE WAY TO GET IT TO WORK ??

ROB